AUTOMOTIVE INDUSTRIES

AUTOMOTIVE and AVIATION MANUFACTURING
ENGINEERING • PRODUCTION • MANAGEMENT

FEBRUARY 1, 1958

In This Issue

New Equipment Installed at the AC Spark Plug Plant
High Spots of the SAE Annual Meeting in Detroit
Special Anodizing Machine in Chevrolet Press Plant
Advanced Equipment for Shock Absorber Production
Semi-Automatic Machine for Assembly of Engines
Many Different Parts Made at Ford Sandusky Plant

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A CHILTON PUBLICATION

THEY *get to take a last look inside*

Standard Oil research develops method for inspecting lubrication of enclosed parts without disassembling

What if you had to make a final inspection of enclosed parts to be sure they were lubricated and you could not do it without disassembling? Standard Oil research scientists have just developed an instrument system that determines lubricant level in an instant. The device measures the density of an assembly so precisely the presence or absence of the desired quantity of lubricant registers on a meter.

Having such a unit might permit you to shorten an assembly line or reorganize assembly operations for greater convenience, speed, economy. The research men at Standard who developed this inspection method will be glad to share their know-how with you to help you fit it to your assembly operations.

This is the research pay-out you get from Standard. This is the "something more" Standard gives to industry besides the research which has established Standard Oil petroleum products as the industry criteria for quality.

For more information about this development or for assistance on other lubrication problems, inquire of any of the 48 Standard Oil district offices in the 15 Midwest and Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**

You expect more from **STANDARD** *and get it!*

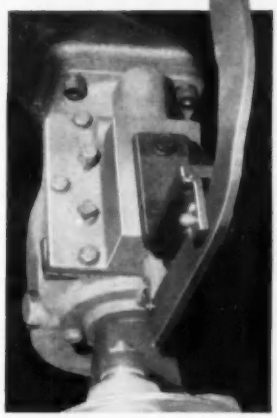
"Workin' on the railroad"

NOW IT'S EASY!

with Cotta two-speed transmission

Digging in new ties with pick and shovel is slow and expensive. Machinery does the job better and faster — especially a machine like the Fairmont Tie Bed Scarifier. This powerful unit digs a uniform tie bed 10 ft long in *only 60 seconds!* Propelling drive uses a rugged Cotta two-speed transmission — low speed for working and high speed for deadheading down the tracks. Fairmont selected Cotta because of excellent performance on other Fairmont equipment.

Heavy-duty Cotta units can be found on rail cars, maintenance of way equipment, locomotives, shovels, cranes, and similar heavy-duty equipment. Look to Cotta if you have a power transmission problem in the input torque range of 150 to 2000 ft lb. Cotta engineers can solve your problem with a standard or "engineered-to-order" unit.



Two-speed heavy-duty transmission on Fairmont Scarifier has low speed for working, high speed for traveling.

THIS INFORMATION WILL HELP YOU

Sent free on request — diagrams, capacity tables, dimensions, and complete specifications. State your problem — COTTA engineers will help you select the right unit for best performance. Write today.

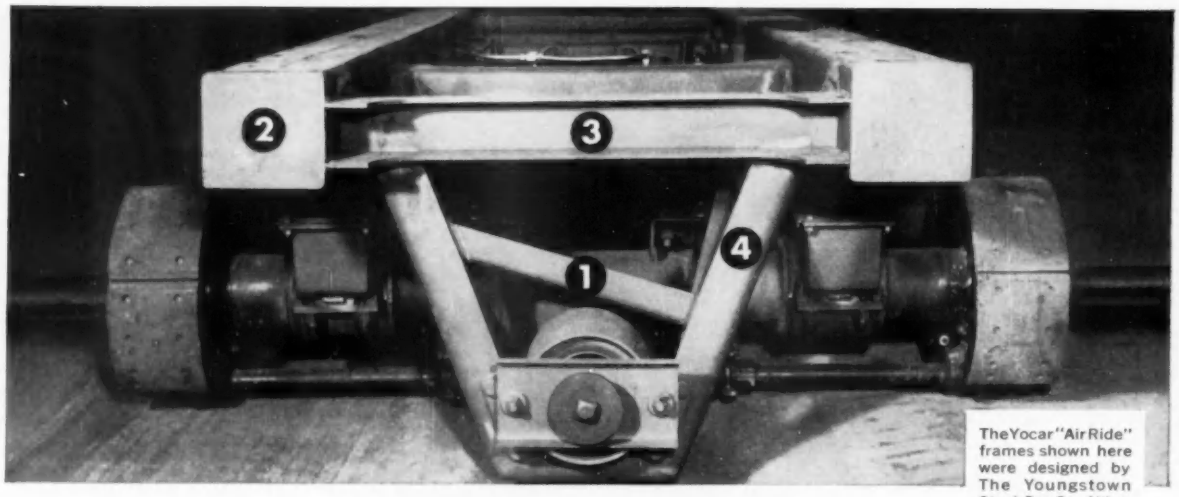
COTTA TRANSMISSION CO., ROCKFORD, ILLINOIS

An Assurance of Dependable Service

COTTA

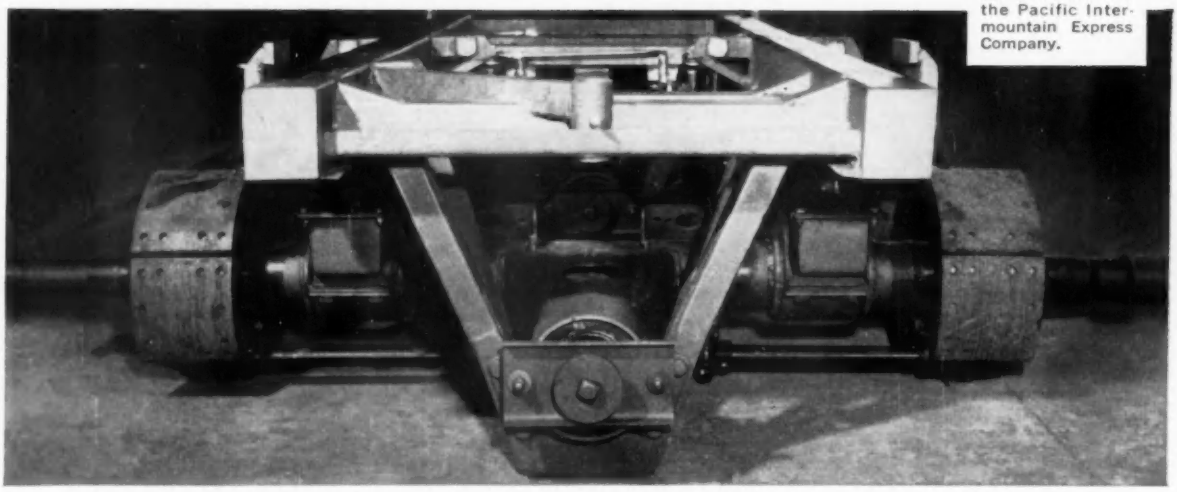
HEAVY-DUTY TRANSMISSIONS

"Engineered-to-order"



The Yocar "Air Ride" frames shown here were designed by The Youngstown Steel Car Co., Niles, Ohio, for installation in vehicles for the Pacific Intermountain Express Company.

1,187 lbs.: Standard carbon steel



900 lbs.: Republic "65" High Strength Steel

New trailer frame assembly weighs 24% less when made from nickel-copper-moly high strength steel

Compare the frame members numbered above. The number 1 frame has been eliminated entirely in the bottom picture. Compare, too, the thinner sections 2, 3 and 4. Each of these sections was reduced in weight when Republic High Strength Steel was used.

REASON? This nickel-copper-molybdenum steel has a high strength-to-weight ratio. The Republic "65" high strength steel used in this trailer has the following typical mechanical properties in the as-rolled condition:

Yield Point	67,000 psi
Ultimate Tensile Strength	89,000 psi
Elongation in 2 inches	18%

RESULT? Design engineers can take advantage of these excellent mechanical properties to incorporate thinner and lighter sections with no sacrifice in strength and safety.

Compared to conventional carbon steels, the use of high strength alloy steels results in important weight reduction . . . often as much as 50%.

If you must save weight and want a steel with high strength-to-weight ratio, excellent mechanical properties and superior corrosion resistance, a high strength, nickel alloy steel may be the answer for you, too. Inco will be happy to help you select one that fits your need. Just write.

THE INTERNATIONAL NICKEL COMPANY, INC.

67 Wall Street — New York 5, N. Y.

INCO NICKEL

AUTOMOTIVE INDUSTRIES

A CHILTON MAGAZINE — PUBLISHED SEMI-MONTHLY

FEBRUARY 1, 1958 — VOL. 118, NO. 3

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MEMBER
NBP National Business Publications, Inc.
SBME Society of Business Magazine Editors
ABC Audit Bureau of Circulations

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At Westinghouse, production men agree on economy of Wean coil processing

Mr. M. W. Stretch, right, of the Manufacturing Planning Department, and his assistant, Mr. M. Avery, discuss Wean's slitting line "after hours."

Until recently, the Electric Appliance Division plant of Westinghouse Electric at Columbus, Ohio was supplying its production lines with steel purchased in sheet form and individually resquared. Some 75 sheet sizes had to be stocked to meet varying requirements.

The installation of Wean slitting and shearing lines in August, 1957 was made after a careful cost analysis of this production process. Now, after five months operating experience, here is how production management at this Westinghouse plant summarizes the advantages of the Wean coil processing system:

Materials Savings: in addition to the initial savings realized by the purchase of coil rather than sheet, scrap is reduced by the close control and accuracy possible on Wean slitting and shearing equipment. Coil is slit in a variety of widths, from 3 to 48 inches, to supply both the shearing line and press lines, now being coil-fed.

Inventory Savings: 3 or 4 standard coil sizes now provide the production flexibility for which 75 sizes of mill-prepared sheet were previously required. In addition, prime plant space for sheet production and storage has been reduced and inventory turnover increased.

Low-Cost Versatility: differing assembly line requirements for sheet are now met quickly and easily, without production delay or the expense of special purchases.

The mechanized handling of metal possible with the Wean slitting and shearing lines also has reduced direct labor costs, freeing men for work in other production departments. And the production rate of the Wean system is more than adequate to match the plant's usage of coil and sheet: in one three-day period, 350 tons of coil were processed on the shearing line.

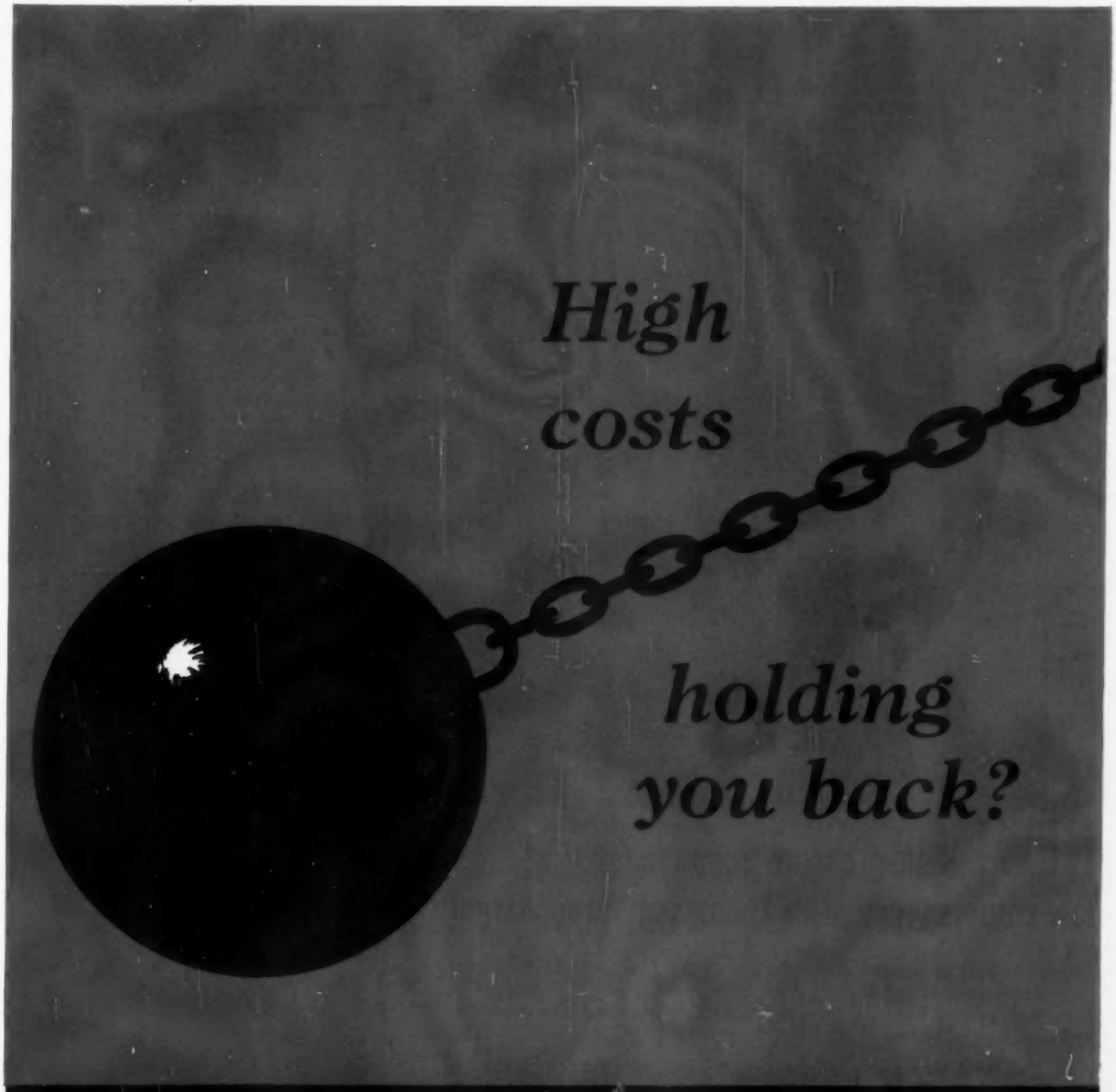
If you use sheet steel in quantity, it's likely that these same savings could result from your plant's use of Wean slitting and shearing equipment. One of our experienced sales engineers will be glad to explore with you the economics of processing from coil to fill your production requirements. May we hear from you?

WEAN

WEAN EQUIPMENT CORPORATION

CLEVELAND 17, OHIO

Detroit • Chicago • Newark



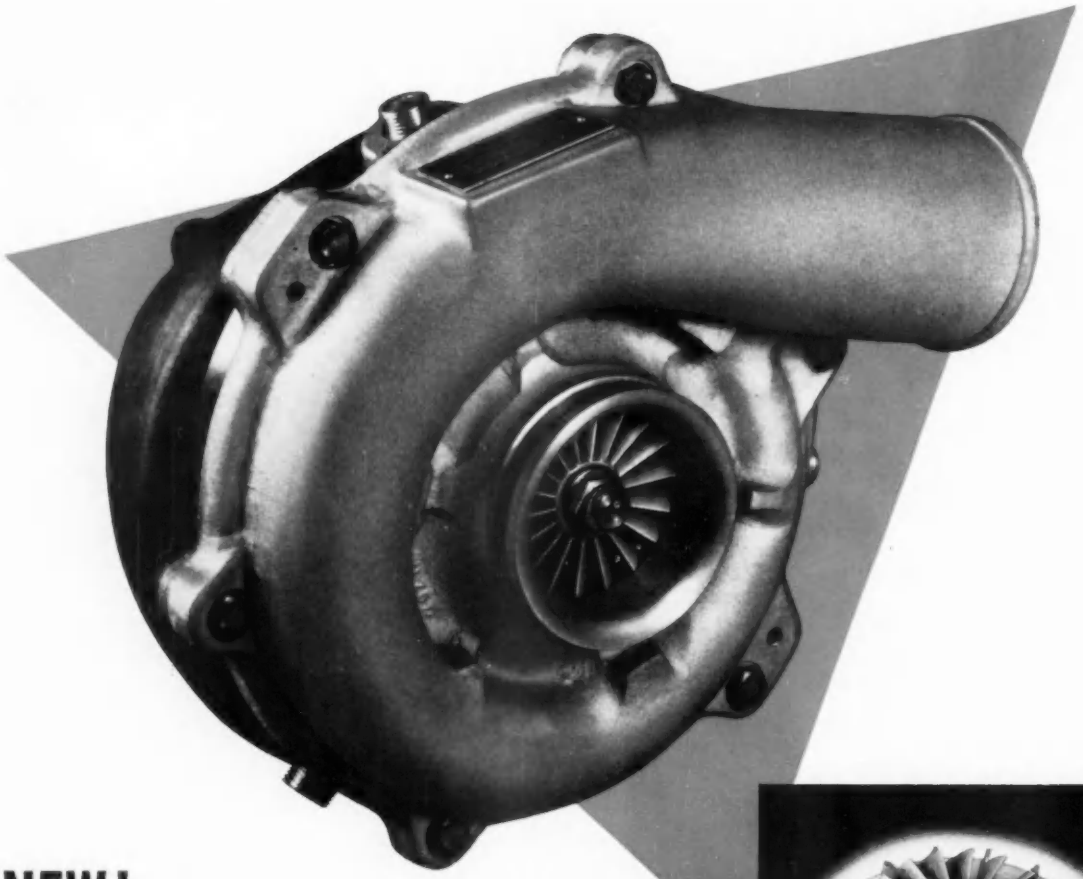
Talk to

Snyder

TOOL AND ENGINEERING COMPANY

3400 E. Lafayette, Detroit 7, Michigan

Special Machine Tools with Automation for More Than 30 Years



NEW! High-pressure supercharging at low rotor speeds with Thompson Turbocharger

Simple, straight rotor vanes enable the new-design Thompson Turbocharger to produce economical high-pressure blowing of diesel engines even at low rotor speeds. Wear on parts is reduced, maintenance and downtime are kept to a minimum.

In the development labs of the Jet Division, impeller vane contours were developed to make use of Thompson's two decades of experience in high efficiency movement of air and gases.

Other *new* features of Thompson Turbochargers include unique small-diameter shaft and bearing to provide lower shaft surface speeds at equal compression ratios. Bearing and shaft wear is kept to a minimum. In addition, unique Thompson design keeps exhaust heat from traveling to bearings and compressor side of the Turbocharger.

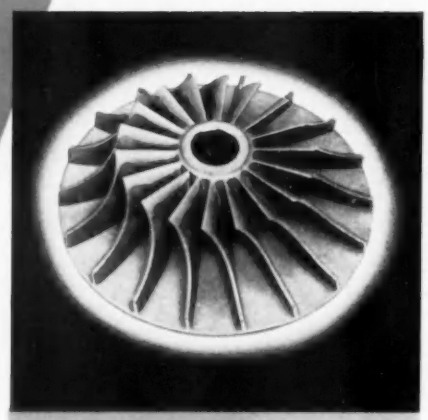
If you build supercharged diesel engines up to 300 horsepower, we can supply a Thompson Turbocharger to provide even more horsepower and fuel economy. If you install diesel engines in trucks or diesel-powered equipment, you'll increase horsepower without increasing engine size by specifying Thompson Turbochargers.

Our sales engineers will help you make the switch to Thompson Turbochargers with practically no redesign of exhaust or intake side. When may they call?

JET DIVISION

Thompson Products, Inc.

Cleveland 17, Ohio



Write today on your company letterhead for Booklet AI-258, which contains technical data on Thompson Turbochargers for blown diesel engines up to 300 horsepower.

XXVI

This is the twenty-sixth of a series of advertisements dealing with basic facts about alloy steels. Though much of the information is elementary, we believe it will be of interest to many in this field, including men of broad experience who may find it useful to review fundamentals from time to time.

Cold-Finishing of Alloy Steels: The Cold-Drawing of Bars

Cold-finishing of alloy bars may be divided into two general categories: (1) cold-drawing, where the bars are pulled through a die with no surface removal; and (2) turning and grinding, which removes the surface. We shall consider the cold-drawing procedure in this discussion.

Cold-drawing is the process of pulling a pickled and limed bar through a die, which results in a bright, smooth finish of the section, combined with close tolerances. The alloy bars are prepared for cold-drawing by pickling in a hot solution of dilute sulphuric acid for removal of scale. This is followed by a water rinse, and immersion in a hot lime-water bath to neutralize the effects of the acid, and to aid in carrying special liquid lubricants into the die.

Alloy bars may be cold-drawn under four conditions: *as-rolled*, *normalized* (low-carbon grades only), *annealed* (lamellar or spheroidized), or *quenched and tempered*. These conditions are determined by the grade of alloy steel, the resultant hardness, and the mechanical properties desired for a given end use.

In cold-drawing, the alloy bar is machine-pointed, to reduce the size at one end so it will pass easily into the die opening. Otherwise, the bar is pushed or extruded into the die by an auxiliary device. A die-holder, which can be made to contain from one to four dies, is mounted in an appropriate head assembled across a "draw bench," so that from one to four bars can be drawn at the same time. The draw bench has a bed which accommodates a 4-wheel buggy with jaws that grip the pointed ends of the bars as they emerge from the dies. The buggy has a hook on one end which engages an endless chain, thus pulling the bars through the dies for their entire length.

After cold-drawing, each bar feeds automatically into a straightening machine, and is sheared or "cracker-cut" to length on appropriate machines. Saws are used when the cross-sections of the bars are too large to be cracked or sheared, or when clean square ends are required.

Smaller sizes in the form of coils are drawn on "bull-blocks," or "wire-blocks," depending on sizes, followed by straightening and cutting on special machines.

Specifications with respect to chemical composition, grain size, hardenability, and the like, of cold-drawn alloy steels have been given long study by Bethlehem metallurgists. If you would like suggestions on cold-drawn products, or any other problem concerning alloy steels, our metallurgists will be glad to give you all possible help, without cost or obligation on your part.

In addition to manufacturing the entire range of AISI alloy steels, Bethlehem produces special analysis steels and the full range of carbon grades.

If you would like reprints of this series of advertisements, please write to us, addressing your request to Publications Department, Bethlehem Steel Company, Bethlehem, Pa. The subjects in the series are now available in a handy 40-page booklet, and we shall be glad to send you a free copy.

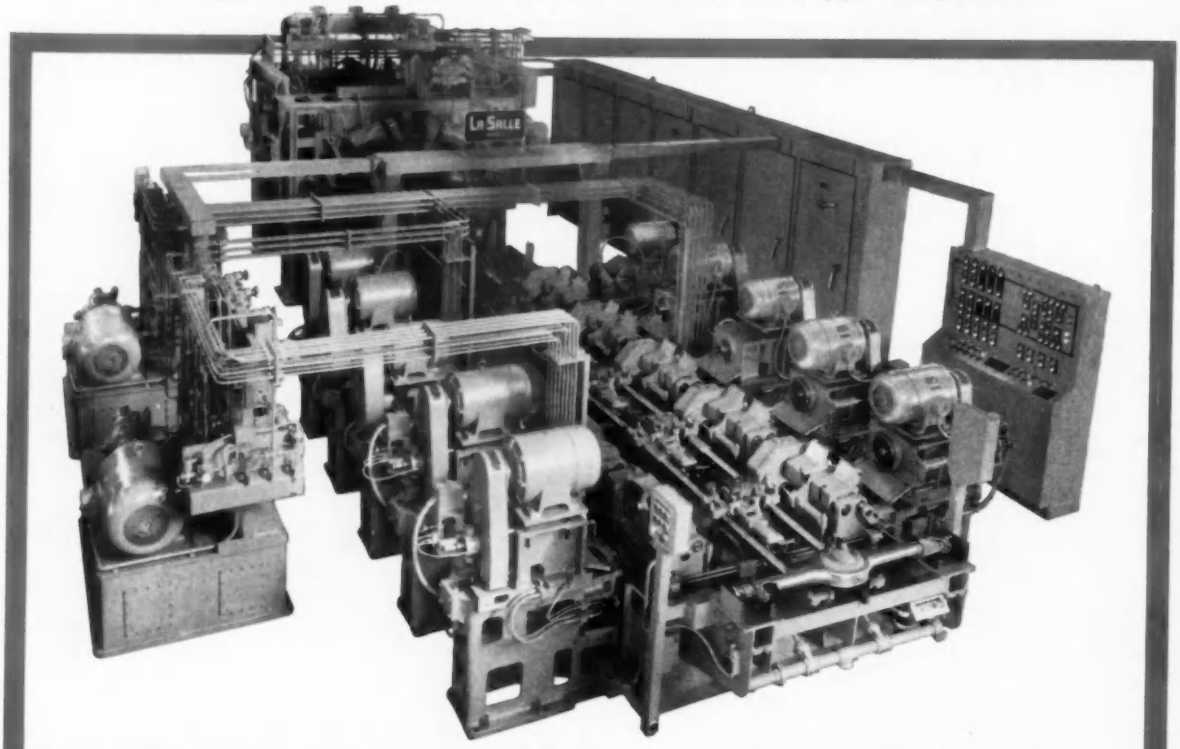
BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

LaSalle Rear Axle Housing Machine

Housings for both CONVENTIONAL and AIR-RIDE Type Suspensions



It Performs 46 Operations at 13 Stations and it Completes all 46 Every 26 seconds

Finished Housing Handles Either Type of Suspension

Each finished housing is machined to handle either the conventional suspension, or the newer air-ride type. And, these housings will handle either type of suspension without further machining.

Standard LaSalle Sectional Modular Machine Construction

It provides complete accessibility to all sections and working tools, and will facilitate future part changes. All spindles are built to accept pre-set tools. Shuttle is the modified walking-beam type.

Built to J.I.C. Standards

Built to J.I.C. Electrical, Hydraulic, Pneumatic, and Lubrication Standards, throughout. Every unit motion, of the machine, is recorded by a mechanical latch-type relay, to guard against double-cycling, or, not cycling of the unit in the set-up.

It's the Newest and Finest Rear Axle Housing Machine

It was engineered and built for one of the leading automobile manufacturers, where high production is a must, for the assembly of high production models.

New Type Console Integrates Hydraulic and Electrical Controls

Hydraulic and Electrical systems are designated to follow the operations of the machine without using electrical or hydraulic diagrams. LaSalle Filters are used to filter all of the oil in the hydraulic system. O-Ring mountings are used for valves and fittings, on all hydraulic manifolds, to eliminate pipe-thread leakage.

Central Coolant and Chip System

There's a central coolant and chip system in this new machine. Moreover, individual regulators provide the coolant at every tool used in the machine.

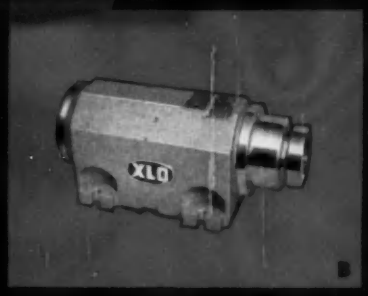
Another Excellent Example of a Dual-Purpose Machine

Write for Detailed Description of all 46 Operations

La Salle tool, inc. ENGINEERING & BUILDING SPECIAL MACHINERY

3840 EAST OUTER DRIVE • DETROIT 34, MICHIGAN

XLO EX-CELL-O FOR PRECISION



A. Standard DB 24 Spindle
B. DB 50 Motorized Spindle
C. DB 25 Square Body Spindle
D. DB 50 Motorized Quill-Type Spindle
E. DB 22 Square Body Spindle
F. Standard DB 22 Spindle

57-90

Greater Accuracy—with Ex-Cell-O Precision Boring Spindles

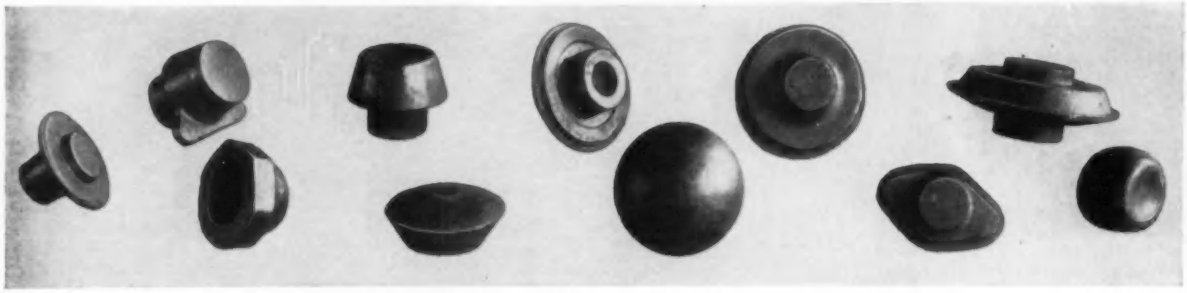
No one need tell you of the proven superiority of Ex-Cell-O precision boring spindles where close tolerances and fine finishes are required. But, did you know that these same Ex-Cell-O boring spindles have been used as replacement units for years?

Produced in belt-driven, standard motorized, or high frequency motorized styles, these Ex-Cell-O precision spindles are equipped with XLO Precision bearings for maximum spindle rigidity, long life and smooth operation. Permanent bearing lubrication reduces maintenance costs, prolongs bearing life.

For complete information, why not get in touch with your local Ex-Cell-O representative or, if you prefer, send direct for bulletin 25477.

EX-CELL-O CORPORATION
DETROIT 32, MICHIGAN
Machinery Division

MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING AND BORING SPINDLES CUTTING TOOLS • TORQUE ACTUATORS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

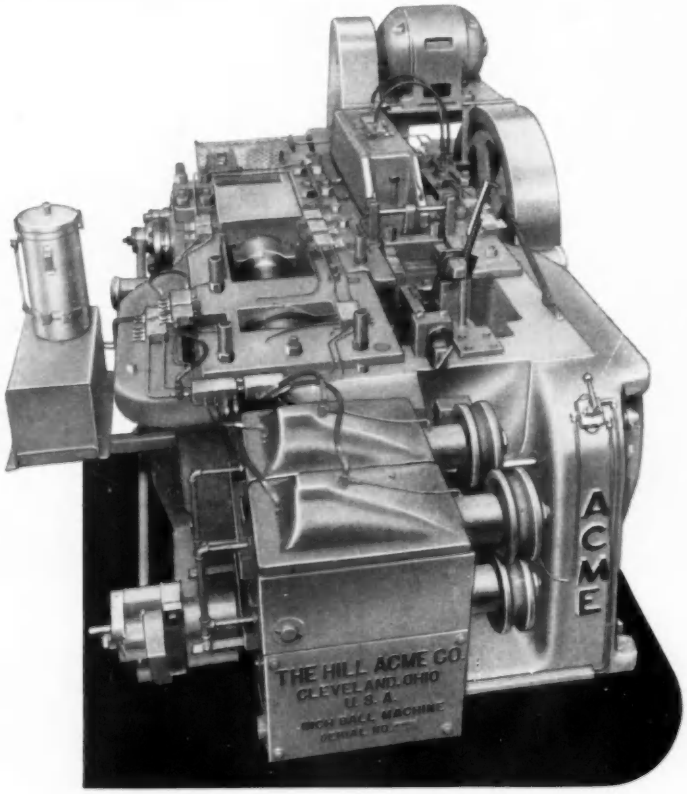


Typical Shapes Produced by ACME Single Blow Forging Machines

SINGLE BLOW FORGINGS
AT 135 PER MINUTE

One man operating this ACME single blow solid die forging machine is producing 135 one inch hard steel balls per minute from 11/16" stock. Automatic feed rolls carry bar stock at proper speed for maximum efficient operation. Adequate safety devices prevent jamming of the die.

ACME solid die forging machines are rated according to the size ball they will forge. Machines are built from 1" to 5" capacity.



Complete information is given in Bulletin SB-57.

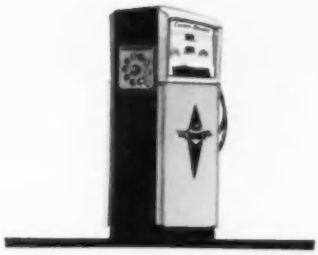
The HILL ACME Company

1209 W. 65th STREET • CLEVELAND 2, OHIO

HILL ACME TOOLS FOR INDUSTRY

Manufacturers of: **"ACME" FORGING • THREADING • TAPPING MACHINES • "CANTON" ALLIGATOR SHEARS • BAR-BILLET SHEARS "HILL" GRINDING & POLISHING MACHINES • HYDRAULIC SURFACE GRINDERS • "CLEVELAND" KNIVES • SHEAR BLADES**

Sun Oil's revolutionary new
Custom-Blending System introduces



An entirely new concept of motor fuel buying

BLUE SUNOCO

Sun Oil Company
Philadelphia 3, Pa.

By solving the octane requirement problems of all cars, past, present and for years to come, Sunoco's revolutionary new Custom-Blending System is ushering in a new era of motor fuel buying.

With conventional two and three-grade marketing systems, motorists have been unable to obtain maximum performance without the penalty of paying for octane their cars don't need.

By offering the first complete range of motor fuels – 6 different grades with graduated increases in octane quality and graduated increments in price – the Sunoco system makes it possible for every car-owner to fit the fuel to his particular car, and pay only for the octane his car needs and can use. And all this from one automatic pump.

No two or three-grade system, with wide gaps in octane quality and price jumps of 3¢ and 4¢ a gallon between grades, can offer such a combination of performance and economy.

6 octane grades automatically blended by 1 pump

Highest Octane at Regular Price

BLEND 200

BLEND 210

BLEND 220

BLEND 230

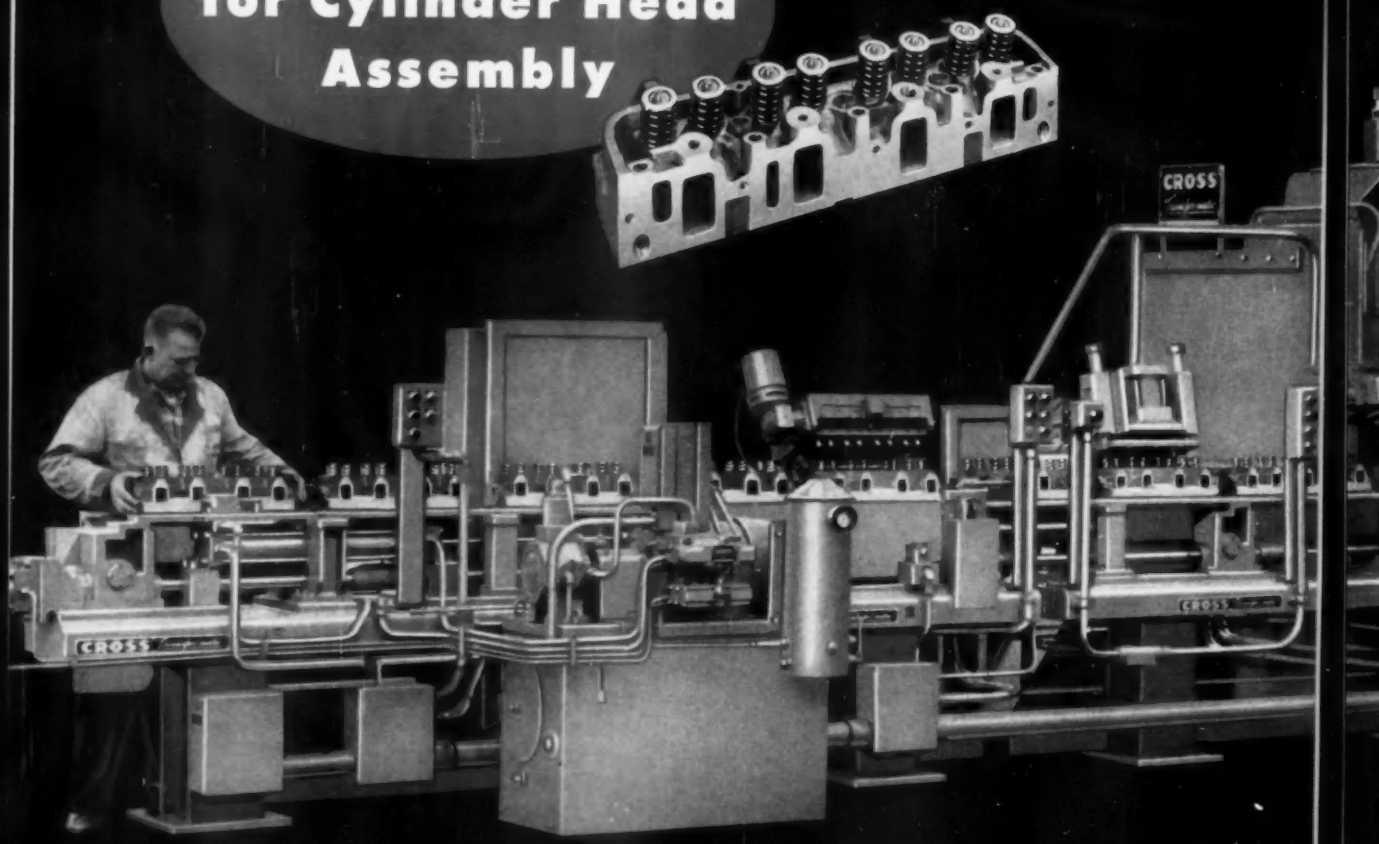
BLEND 240

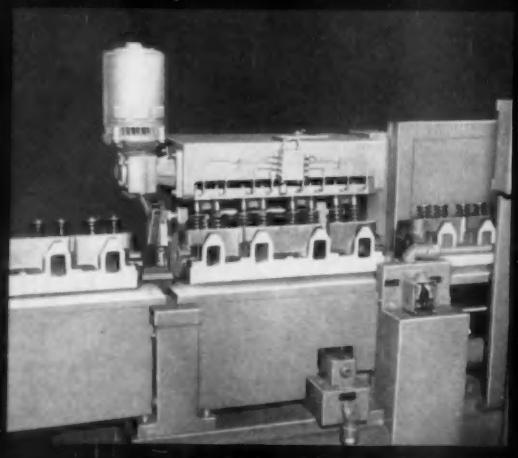
BLEND 260

Highest Octane Anywhere At Any Price

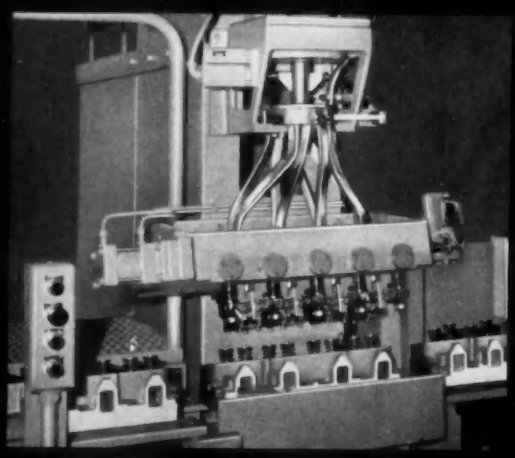
The higher the blend number, the higher the octane quality...
The lower the blend number, the lower the price.

Automation for Cylinder Head Assembly



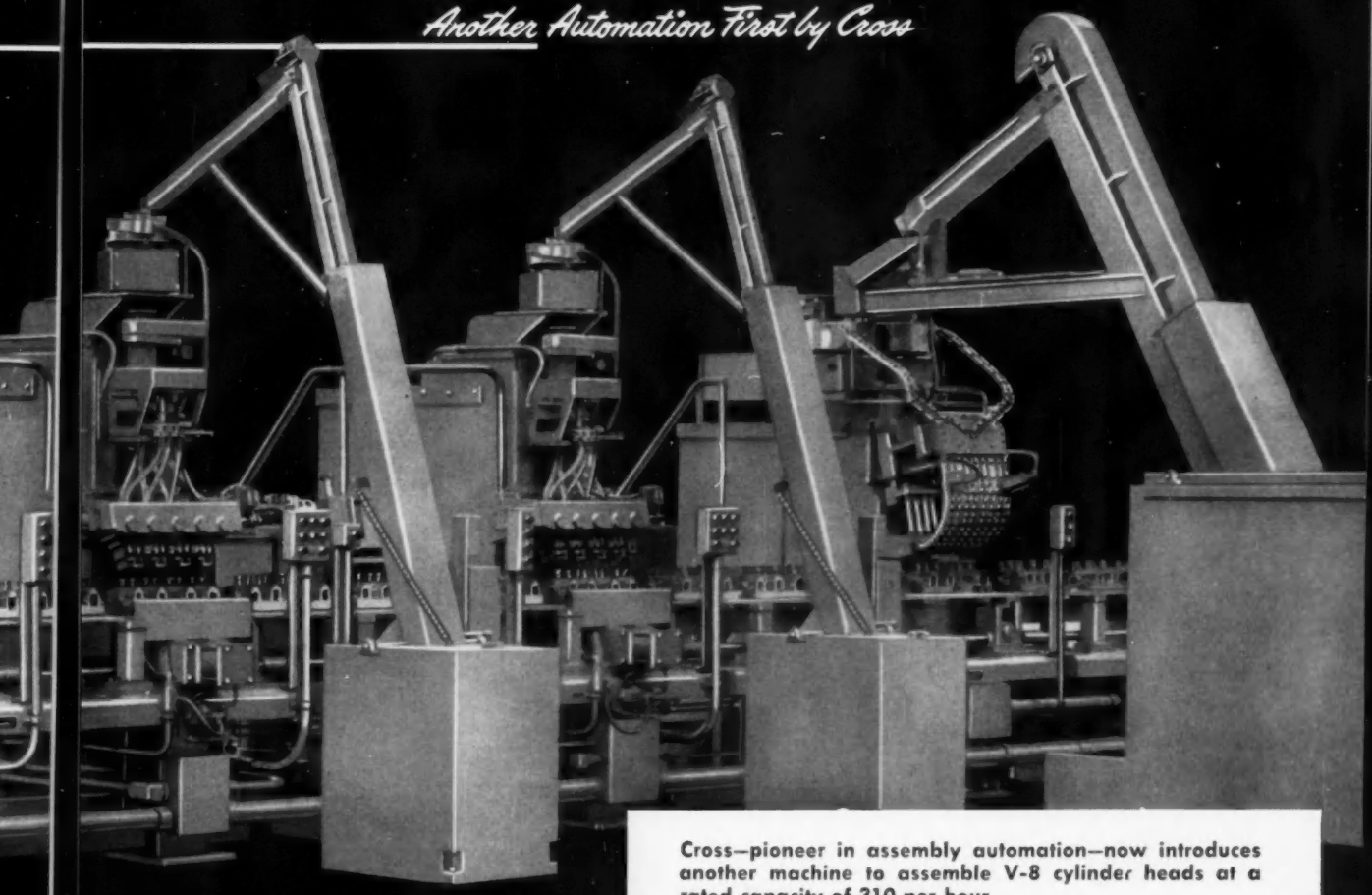


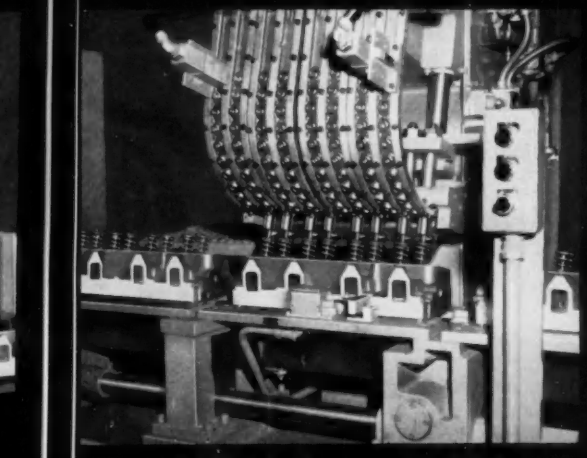
Station 25: Valve "popping".



Station 17: Automatic assembling of valve locks.

Another Automation First by Cross





Station 13: Automatic assembling of valve spring retainers.

Cross—pioneer in assembly automation—now introduces another machine to assemble V-8 cylinder heads at a rated capacity of 310 per hour.

Cylinder head castings with intake and exhaust valves in place are loaded automatically at Station 1. At Stations 3, 4, and 5, rubber grommets are placed over the valve stems. At Station 7, an inspection is made for faulty valves and grommet positioning. If necessary, heads are removed, repaired and returned at Stations 8, 9, and 10. Valve springs, spring retainers and spring retainer sleeves are automatically assembled at Stations 11, 13, and 15 respectively. Valve locks are automatically assembled at Stations 17 through 23 with standby units for manual assembly at Stations 19 and 23. At Station 25, all valves are "popped" before unloading the finished assemblies at Stations 27, 28 and 29.

A unique feature of the machine is the transfer mechanism which lifts and carries the parts between stations to eliminate pallet fixtures used by older assembly machines.

Building block construction provides flexibility for engine design changes and for additional automatic assembly devices of the future.

Like other Cross machines, all parts—even tooling details—are made to interchangeable tolerances for fast, easy maintenance. Other features include construction to JIC standards and automatic lubrication.

Established 1898

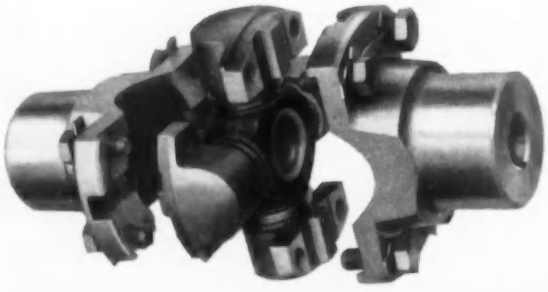
THE **CROSS** CO.

First in Automation

PARK GROVE STATION • DETROIT 5, MICHIGAN

Designers

Many of the key men who make MECHANICS joints have been doing so for over a quarter century. They know how to make MECHANICS JOINTS—from metal formula to final assembly—so the joints will serve better and longer than any "chinese copy". If you want the universal joints in *your* product to have ALL of the advantages of MECHANICS JOINTS—Compact Design, Key Drive, Better Balance, Less Weight, Fewer Parts, Easier Assembly and Quicker Servicing—specify MECHANICS and be sure of getting the genuine. Our engineers will welcome the opportunity to help you design MECHANICS' competitive sales and service features into *your* product's transmission train.



When You Specify

MECHANICS

You Get the Benefit

of Over 25 Years of

Development Know-How

From the Originators

of the Key-Drive

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JOINT

MECHANICS UNIVERSAL JOINT DIVISION

Borg-Warner • 2024 Harrison Ave., Rockford, Ill.

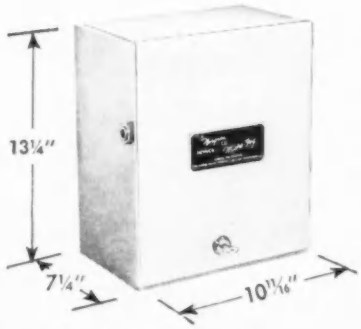
Export Sales: Borg-Warner International
36 So. Wabash, Chicago 3, Illinois

Norgren MICRO-FOG LUBRICATION

NEW...

Compact, Tamper-Proof Cabinet Units

lubricate all bearings, gears, chains and cams on a machine



1 QT. OR 2 QT. OIL CAPACITY
200 OR 300 BEARING INCH RATINGS

These new Norgren units provide ideal lubrication by applying just the right amount of air-borne oil fog to all bearing surfaces. The standard unit includes an automatic-drain air line filter, a solenoid valve, a pressure regulator, a pressure switch and a MICRO-FOG Lubricator . . . *and provides the following important advantages:*

- **TAMPER-PROOF** — Totally enclosed key-locked cabinet prevents tampering.
- **SPLASH-PROOF** — Coolant and corrosive liquids cannot reach interior of enclosure.
- **CONVENIENT TO SERVICE** — Removable one-piece top and side panel — secured by key lock — provides easy access for authorized personnel. Visual oil feed is proof of lubrication. Oil level gauge glass provided on lubricator.
- **SAFEGUARDS MACHINE COMPONENTS** — Pressure switch actuates alarm or shuts down machine if air pressure fails.
- **HEATER AND OIL LEVEL CONTROL OPTIONAL** — Thermostatically-controlled Heater, for 1 Qt. units, maintains uniform lubricant temperature and viscosity. Oil level control actuates alarm or stops machine when oil needs replenishing.

For complete information, call your nearby Norgren Representative listed in your telephone directory — or WRITE FACTORY FOR NEW No. 900 CATALOG.

C. A. NORGREN CO.

3460 SOUTH ELATI STREET — ENGLEWOOD, COLORADO

Meet the new army Mule!

Foot soldier's new friend is light, strong, maneuverable because many parts are made of MAGNESIUM

The U. S. Army has a new mule . . . minus the stubborn disposition! Developed by Willys Motors Inc., and Army Ordnance, it's the first mule in history—and the first Army vehicle—to carry a load heavier than its *own weight*. A major reason: Magnesium is used for the platform and wheel castings.

Because of its light weight and simplicity of design, the Mechanical Mule can be turned on its side or even upside down for maintenance or transportation purposes. It can be carried by helicopter . . . or dropped by parachute. Because of its strength, this vehicle can carry 1,000 pounds of equipment—yet it weighs only 900 pounds!

After successfully completing high-priority tests, the Mule has been placed in production and initial deliveries are being made to the famous 101st "Screaming Eagles" Airborne Division. This is another successful application of magnesium, lightest of all structural metals. If your product can benefit from this excellent combination of lightness and strength, be sure to contact your nearest Dow sales office or write THE DOW CHEMICAL COMPANY, Midland, Michigan, Dept. MA 1411E.

DRIVER'S SEAT and controls are located in the front, engine is underneath in the rear. Lightness, strength and simplicity of design—benefits of magnesium—were utilized fully in this new army vehicle.

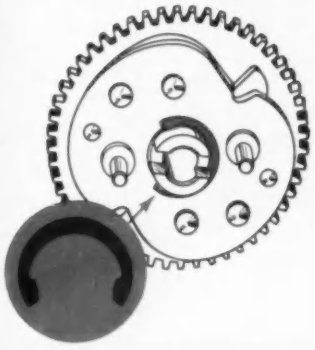
WALKING, RIDING OR CRAWLING, the soldier can steer and control the speed to as low as 1 mph in forward or reverse—or cruise along at the rate of 25 mph!

YOU CAN DEPEND ON DOW

Waldes Truarc Rings speed assembly, facilitate maintenance, improve performance of new automatic calculator

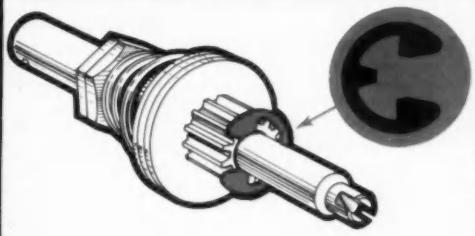
THE NEW MARCHANT DECI•MAGIC

automatic-decimals calculator made by Marchant Calculators, Inc., Oakland, California.

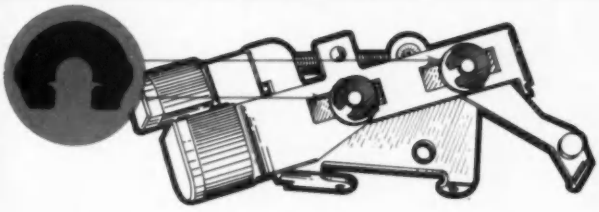


CRESCENT RING SPEEDS ASSEMBLY, DISASSEMBLY

Main clutch utilizes radially-installed series 5103 crescent ring for rapid assembly and disassembly. Ring's low protruding shoulder provides necessary clearance between ring and the two studs. The main clutch operates each time a Deci-Magic control key is depressed.



E-RING SECURES PARTS AGAINST SPRING THRUST. Slip clutch assembly uses Truarc series 5133 E-ring to hold parts on shaft. Functioning of the assembly is dependent upon the ring's ability to withstand thrust exerted by the heavy barrel spring.



LOCKING PRONG RINGS PERMIT SIMPLE DESIGN. Shift slide assembly uses two Truarc series 5139 bowed locking prong rings to lock the parts together in a sliding fit. Precise amount of spring tension prevents objectionable wobble and noise, permits the key to slide smoothly in operation. Easy radial assembly and disassembly of rings facilitates field maintenance and repair. Alternative construction would have required cut washer, spring washer and hairpin-type spring clip on each stud.

Whatever you make, there's a Waldes Truarc Ring designed to save you material, machining and labor costs, and to improve the functioning of your product.

In Truarc, you get

Complete Selection: 36 functionally different types. As many as 97 standard sizes within a ring type. 5 metal specifications and 14 different finishes. All types available quickly from leading OEM distributors in 90 stocking points throughout the U. S. and Canada.

Controlled Quality from engineering and raw materials through to the finished product. Every step in manufacture watched and checked in Waldes' own modern plant.

Field Engineering Service: More than 30 engineering-minded factory representatives and 700 field men are at your call.

Design and Engineering Service not only helps you select the proper type of ring for your purpose, but also helps you use it most efficiently. Send us your blueprints today...let our Truarc engineers help you solve design, assembly and production problems...without obligation.

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RETAINING RINGS

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Waldes Kohinoor, Inc., 47-16 Austel Place, L. I. C. 1, N. Y.

Please send new, descriptive catalog showing all types of Truarc rings and representative case history applications. *(Please print)*

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Company .....

Business Address .....

City ..... *Zone* ... *State* ...

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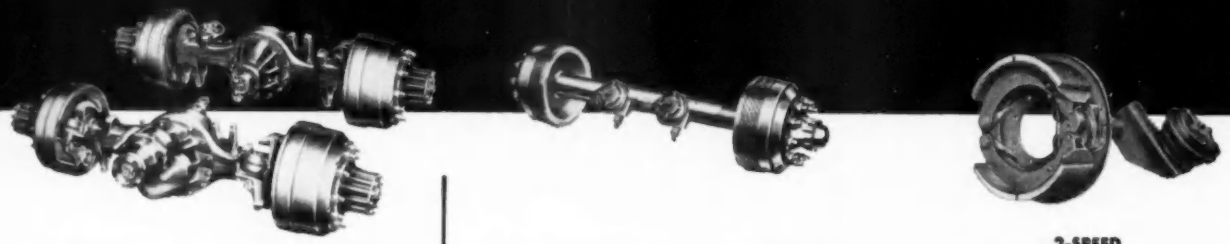
WALDES TRUARC Retaining Rings, Grooving Tools, Pliers, Applicators and Dispensers are protected by one or more of the following U. S. Patents: 2,382,948; 2,411,426; 2,411,761; 2,416,852; 2,420,921; 2,428,341; 2,439,785; 2,441,846; 2,455,165; 2,483,379; 2,483,380; 2,483,383; 2,487,802; 2,487,803; 2,491,306; 2,491,310; 2,509,081; 2,544,631; 2,546,616; 2,547,263; 2,558,704; 2,574,034; 2,577,319; 2,595,787, and other U. S. Patents pending. Equal patent protection established in foreign countries.

For Today's Most Complete Line of Quality

SPECIFY... TIMKEN-DETROIT®



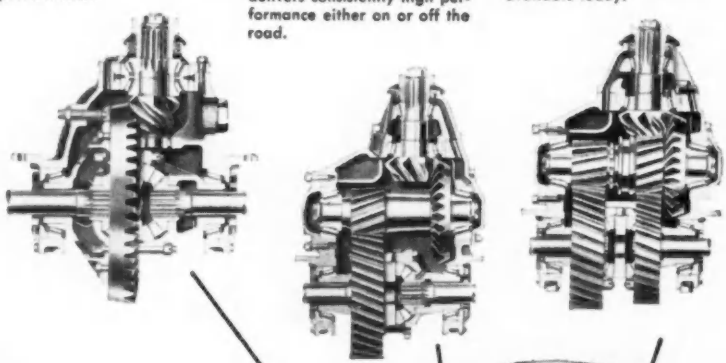
Whatever your requirements for highway or off-the-road equipment—Timken-Detroit offers you a full line of driving, trailer and front axles... brakes and gear boxes... backed by over 50 years of manufacturing experience and proved by field performance and laboratory testing.

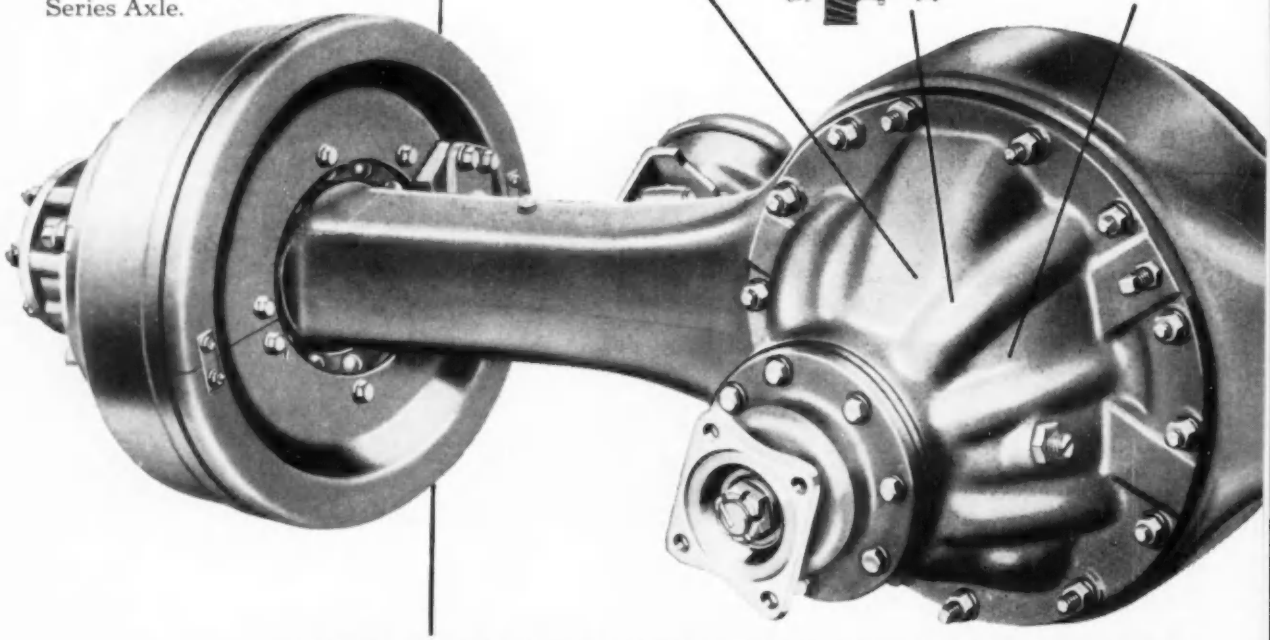
One example of the engineering features and superior quality built into *every* Timken-Detroit product is the improved "3 for 1" Letter Series Axle.

HYPOID SINGLE-REDUCTION!
A rugged single-speed power train that provides the very maximum in single reduction performance.

SINGLE-SPEED HYPOID-HELICAL DOUBLE-REDUCTION!
This advanced single-speed double-reduction final drive delivers consistently high performance either on or off the road.

2-SPEED HYPOID-HELICAL DOUBLE-REDUCTION!
This final drive gives you the most advanced two-speed double-reduction gearing available today.





WORLD'S LARGEST MANUFACTURER OF AXLES FOR TRUCKS,

Axles and Brakes for Commercial Vehicles

Products of Rockwell Spring and Axle Co.

IMPROVED TIMKEN-DETROIT "3 FOR 1" LETTER SERIES DRIVING AXLES WILL DO THE JOB BETTER THAN EVER BEFORE!

With the "3 for 1" you gain maximum interchangeability. You have your choice of three interchangeable final drives... using the same housing, hubs, drums, brakes and axle shafts. All parts are standard production items.

Timken-Detroit "3 for 1" Letter Series Driving Axles give you longer operating life . . . lower maintenance cost ...smaller replacement parts inventory.

Check these "3 for 1" features:

Improved Hypoid Gears! Redesigned offset and increased Hypoid gear diameter provide longer gear life, smoother performance, and quieter operation.

Refined two-speed shift collar and cross shaft! Improved design gives positive locking action—reduces gear wear and maintenance. Each set of teeth performs but one function, driving or locking.

Improved torsion-flow axle shafts! More splines per shaft and increased root diameter give greater torsional strength, longer life.

Famous time-proved differential—rugged, reliable and smooth! Extra strong gear body and teeth, plus hot-forged trunnion, give long trouble-free operation even under the roughest kind of treatment.

Hot forged steel axle housing! The rectangular form of these high-carbon steel housings is the lightest, strongest shape of housing that is available today.

Improved "P" Series Power Brakes and "DH" Series Hydraulic Brakes! Available in a complete range of sizes, these advanced brakes offer the most dependable stopping power—lower maintenance cost—easy adjustment and longer service.

Plants at: Detroit, Michigan
Oshkosh, Wisconsin • Kenton and Newark, Ohio
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TIMKEN Detroit AXLES
TIMKEN-DETROIT AXLE DIVISION
ROCKWELL SPRING AND AXLE COMPANY
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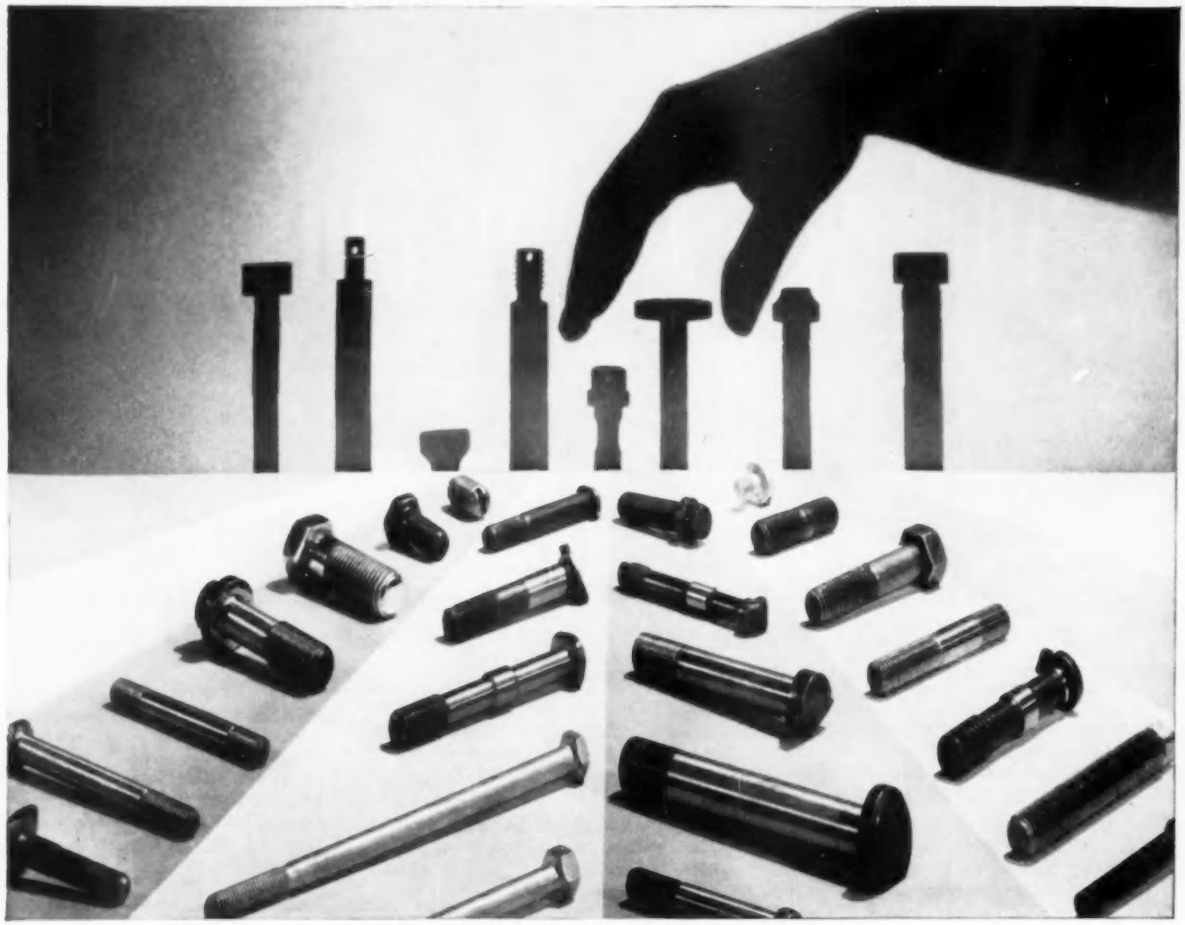
BUSSES AND TRAILERS



IMPROVE DESIGN . . . *get assistance*

from Ferry Cap—fastener experts for 50 years

Often we can suggest a fastener of special shape that will reduce your over-all product costs. Sometimes these special screws eliminate parts, replace more expensive parts, or reduce assembly time. Frequently they improve product performance. In all cases, Ferry Cap customers get the benefit.

Give us a call and have a talk with one of our "Fastener Engineers."

THE FERRY CAP & SET SCREW COMPANY

Makers of the famous Countr-Bor® Screw for socket head applications.

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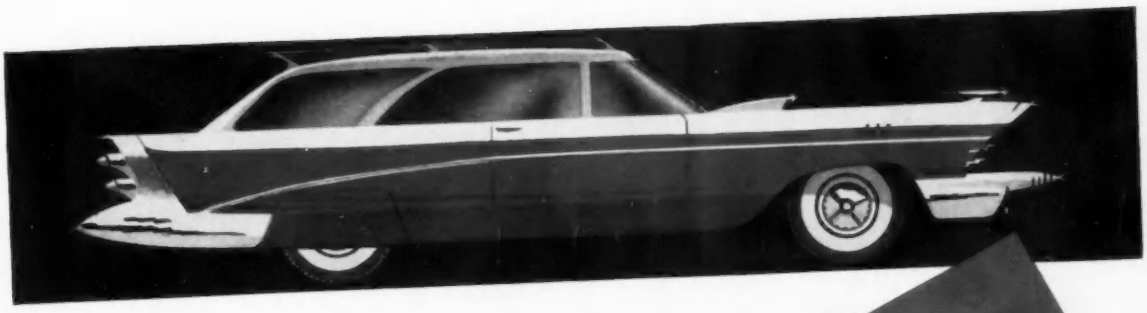
FERRY CAP *is geared to FASTER SERVICE*

CLEVELAND

Universal Joints,
Propeller Shafts and
Power Take-Off Joints

...In Step With The Modern Trend

New, more powerful engines, lower silhouette designs and smaller clearances of today's motor vehicles demand a new type of propeller shaft. It takes a plenty rugged assembly of much higher capacity, capable of working in a much smaller radius, to meet today's exacting requirements.



Having anticipated this trend to super power and super sleekness, "Cleveland" is ready with many new series of propeller shafts. These have greatly *increased* strength and *decreased* swing diameter and also incorporate the many advantages of the celebrated 32 tooth conventional spline shaft pioneered by "Cleveland".

Look to "Cleveland" for propeller shaft and universal joint requirements. We'll welcome the opportunity to work with you.

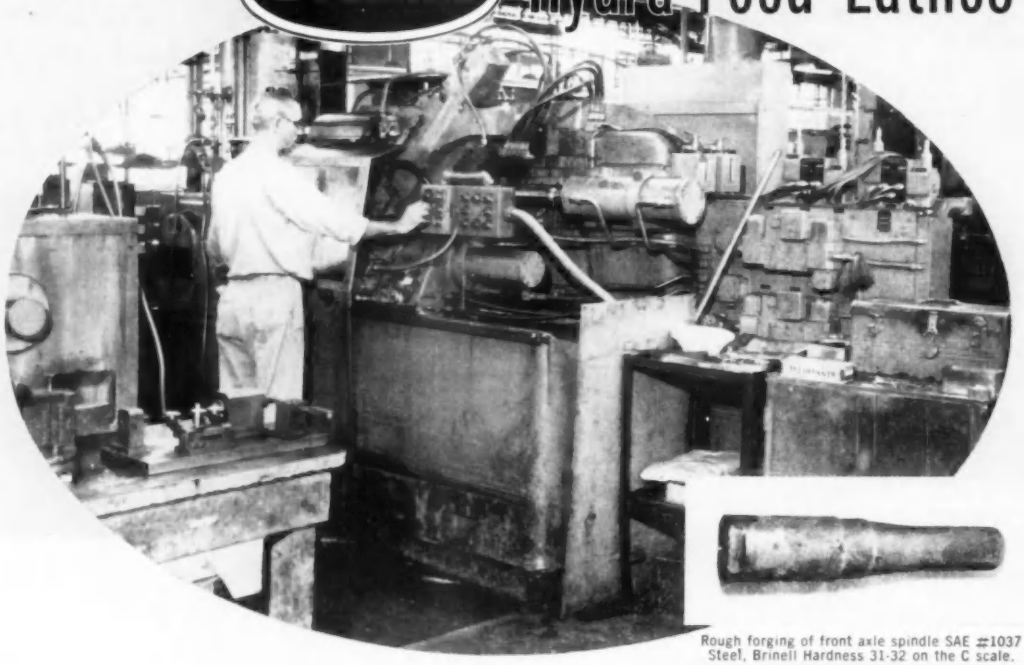
Since 1912
Cleveland Steel Products Corporation
Automotive Division

16025 Brookpark Road
Cleveland 11, Ohio

1st Choice

For Versatility and Adaptability

BULLARD Hydra-Feed Lathes



Rough forging of front axle spindle SAE #1037 Steel, Brinell Hardness 31-32 on the C scale.

The Senior Engineer at one of the leading motor car manufacturers in Detroit, was looking for a tracer lathe that went beyond his immediate requirement and offered easy conversion to other uses in years to come, to give longest tool life, to do the job with a minimum of shutdown time, to handle future developments in the realm of cutting tools, to reduce scrap to a minimum.

The answer to this multiple problem, according to the Senior Engineer was "BULLARD HYDRA-FEED TRACER LATHES."

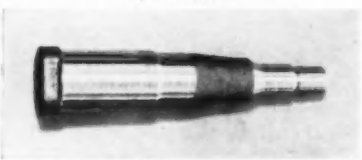
We invite you to investigate the advantages which Bullard Hydra-Feed Lathes, either tracer or multiple tool models, offer you. Phone or write your nearest Bullard Sales Office, Distributor or

THE BULLARD COMPANY

BRIDGEPORT 9, CONNECTICUT

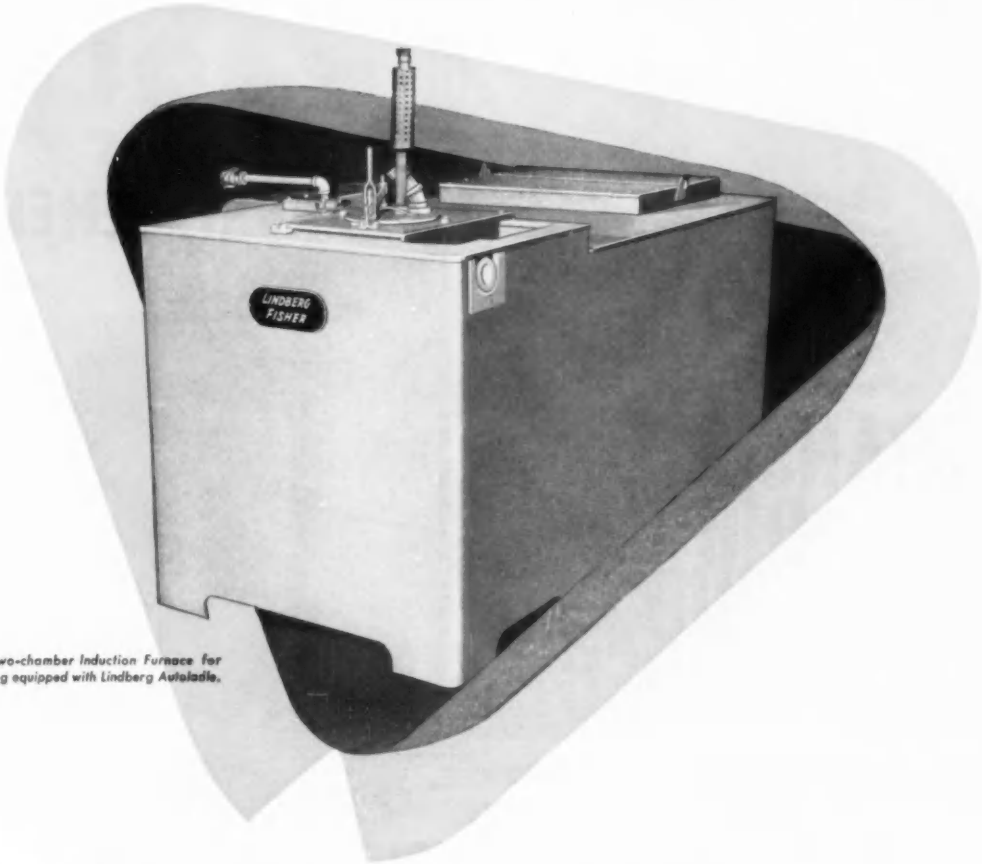
Rough turning with Rear Tracer Slide.

Finish turning with Right-Hand Top Tracer Slide



Finished piece complete cycle time — 65 seconds.

Here's the ideal combination for casting aluminum automatically



Lindberg-Fisher two-chamber Induction Furnace for melting and holding equipped with Lindberg Autoladle.

Do you die-cast aluminum? Then take Lindberg's famous two-chamber induction melting and holding furnace, add "Little Joe" Lindberg's new automatic pump, and you'll have the most efficient automatic combination anywhere. The Lindberg-Fisher two-chamber furnace *melts* in one chamber, *holds* metal at precisely the right temperature in the other chamber, and "Little Joe" automatically delivers exactly the right size shot to the casting machine. With this combination all handling of molten metal is eliminated, perfect control of metal temperatures and shot size is maintained, and all automatically. For safer, more economical, more precise handling of aluminum or any non-ferrous metals or alloys better see Lindberg. Just get in touch with the Lindberg plant or the Lindberg Field Representative in your locality, or write Lindberg-Fisher Division, Lindberg Engineering Company, 2491 West Hubbard St., Chicago 12, Illinois. Los Angeles Plant: 11937 S. Regentview Ave., at Downey, California.

LINDBERG heat for industry

FIRST TIME EVER!

Another

CYCOLAC®

HIGH IMPACT THERMOPLASTIC RESIN

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PROVIDES FASTER PRODUCTION, EASIER ASSEMBLY, *LOWER MANUFACTURING COSTS...*

Only CYCOLAC measured up to all requirements for the first extruded transistor cabinets ever made! Imagination and engineering provided savings of 87% on dies and engineering costs alone. CYCOLAC also has many other outstanding properties which made this possible. High impact strength, bright glossy colors, light weight, dimensional stability, excellent shock resistance, chemical resistance, and superb electrical properties. Moving smoothly off the production line, extruded profiles are cut to width, speaker openings die-stamped, units inverted, cemented and presto! . . . cases are complete! To add to your profit picture, find out how CYCOLAC can help *you* make more attractive, better products and *save* money!

* **Extruded transistor radio cabinets used in Knight-Kits produced by Custom Plastics, Inc., for Knight Electronics Division of Allied Radio Corp., Chicago, Ill.**

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ENJAY BUTYL—fabulous all-weather rubber
BOOSTS PERFORMANCE IN '58 CARS

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HERE'S ONE — MORE TO COME

New Skinner Valves at Low Prices

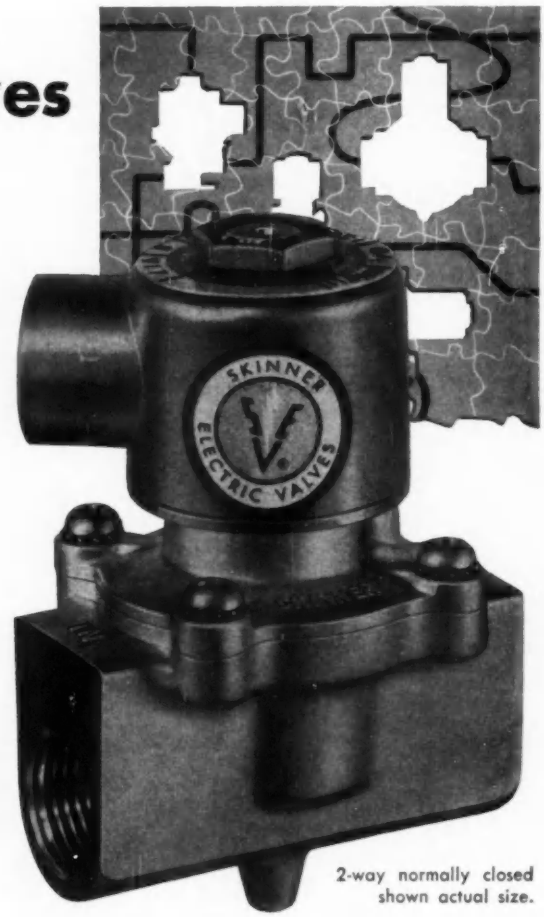
Here it is — one of the many new lines Skinner will bring you in 1958. A new 2-way, normally closed, pilot-operated valve that is lighter in weight — only 1 ¾ pounds — and smaller in size, yet permits full flow through a ½" orifice with ⅜" or ½" pipe taps.

The valve handles pressures from 5 psi to 150 psi, with temperature ranges from —40°F to 180°F, and will operate on all popular AC and DC voltages. It's small but rugged, economical but efficient — manufactured to the highest engineering standards of the Skinner Valve line.

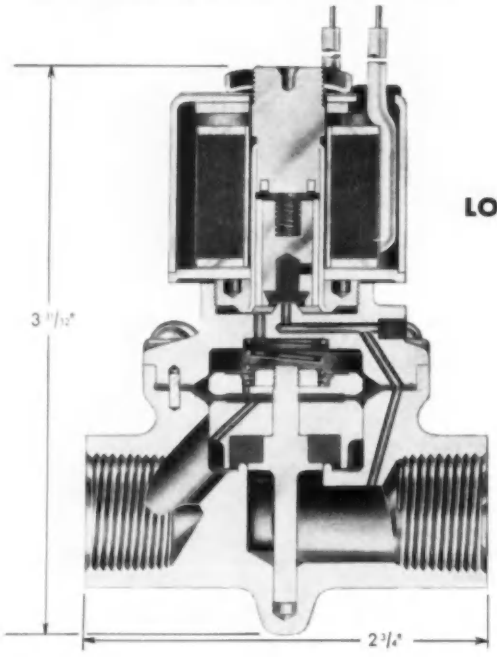
Versatility is also a feature of the new Skinner L Series; modifications are already available for normally open operation, with such options as manual override, explosionproof construction and choice of electrical connections to fit your application requirements.

* * *

You can get full details of this exciting, new valve line by writing us direct or by contacting the Skinner Representative or Distributor near you. He's listed in the Yellow Pages. Write Dept. 332.



2-way normally closed shown actual size.



LOOK AT THESE HIGH-QUALITY FEATURES:

- Unique Diaphragm Design — by actual test, this new design outperforms all others — the diaphragm is completely supported at all times. The nylon-reinforced buna diaphragm has a high resistance to media impurities, and only a small area is exposed to pressure, which assures long, trouble-free life.
- So Easy to Mount — so light in weight that it can economically mount directly to line.
- Operates upside down, sideways, in any position — strong spring action snaps valve shut — every time.
- Forged Brass Body — provides low porosity and dense metal structure for rugged application and no leakage.
- Low Wattage Consumption — coil consumes only 8 watts, considerably less than comparable valves.
- Soft, Synthetic Inserts — withstand constant opening and closing of pilot and main orifices — are long-wearing and provide absolute bubbletight operation.
- Internal Stainless Steel Parts — eliminate internal rusting, clogging or contamination.

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THE CREST OF QUALITY

SKINNER ELECTRIC VALVE DIVISION
NEW BRITAIN CONNECTICUT
105 EDGEWOOD AVENUE

There is NO SUBSTITUTE for a forging: NO SUBSTITUTE for Wyman-Gordon Experience

There is more to the superiority of the forged crankshaft than just strength.

No other method of fabrication can compare with the forging process for dependability. The uniformity and predictability of physical properties with minimum variance from piece to piece or from one location to another in the same piece is assured to the greatest degree by modern forging practice.

Top automotive engineers agree that the use of a forged crankshaft permits the design of a more compact engine which is a decided advantage when thinking in terms of limited space available and overall engine weight reduction.

As compression ratios increase and engine outputs go up the risk factor must be reduced. Again, the uniformity of quality in the backbone of the engine, the crankshaft, is most essential and made possible only by a forging.

There is NO SUBSTITUTE for a forging and in a forging there is NO SUBSTITUTE for WYMAN-GORDON quality and experience.

WYMAN-GORDON COMPANY

Established 1883

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YOU GET ALL THREE FROM UDYLITE PLANNED LAYOUTS

Here is a typical alkaline or acid barrel plating plant layout designed by the UDYLITE Engineering Department for fast, efficient metal finishing. This system, with the proper UDYLITE equipment placed in a practical flow chart pattern, comprises the ultimate in modern plating production.

Naturally, different plant limitations and end-products require an individually planned layout. For this reason, the UDYLITE Engineering staff and their knowledge are available to you for your particular shop needs. If a modern, money-saving plating plant is your goal . . . why not let UDYLITE help you plan it!

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CALENDAR

OF COMING SHOWS AND MEETINGS

American Society for Quality Control, Administrative Applications Div. annual conference, Carter Hotel, Cleveland, O...Feb. 7-8

Motor and Equipment Wholesalers Association, national convention, Statler Hotel, Los Angeles, Calif. .....Feb. 18-19

Pacific Automotive Show, Pan Pacific Auditorium, Los Angeles, Calif. .....Feb. 20-23

American Society for Quality Control, Middle Atlantic Conference, Hotel Statler, New York, N. Y. .....Feb. 28-Mar. 1

Leipzig Spring Fair, Leipzig, Germany .....Mar. 2-11

ASME Gas Turbine Power Div. Conference and Exhibit, Shoreham Hotel, Washington, D. C. Mar. 3-6

SAE Passenger Car, Body and Materials Meeting, Sheraton-Cadillac Hotel, Detroit, Mich...Mar. 4-6

Instrument Society of America, Pittsburgh Section Annual Conference on Instrumentation for Iron and Steel Industry, Roosevelt Hotel, Pittsburgh, Pa..Mar. 11-13

Steel Founders' Society of America, annual meeting, Drake Hotel, Chicago, Ill. .....Mar. 17-18

ASME Aviation Division Conference, Hotel Statler-Hilton, Dallas, Tex. .....Mar. 17-20

International Atomic Exposition, Inc., International Amphitheatre, Chicago, Ill. .....Mar. 17-21

ASME Committee on Management Conference, Hotel Somerset, Boston, Mass. .....Mar. 19-20

SAE Production Meeting and Forum, Drake Hotel, Chicago, Ill. .....Mar. 31-Apr. 2

International Automobile Show, N. Y. Coliseum, New York, N. Y. .....Apr. 5-13

SAE Aeronautic Production Forum and Aircraft Engineering Display, Hotel Commodore, New York, N. Y. .....Apr. 8-11

ASME Design Engineering Conference, International Amphitheatre, Chicago, Ill. .....Apr. 14-17

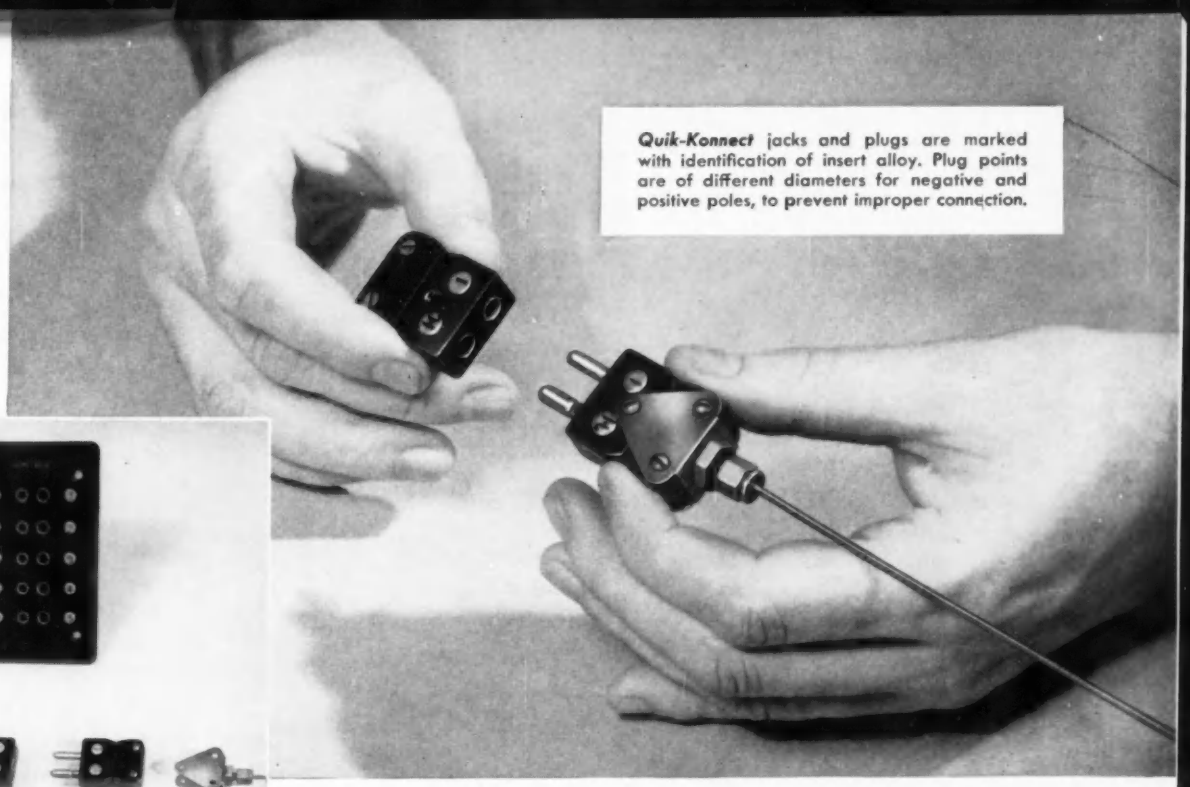
American Welding Society Show and annual technical meeting, Kiel Auditorium and Hotel Statler, St. Louis, Mo. ....Apr. 14-18

Institute of Environmental Engineers, second annual meeting, Hotel New Yorker, New York, N. Y. .....Apr. 17-18

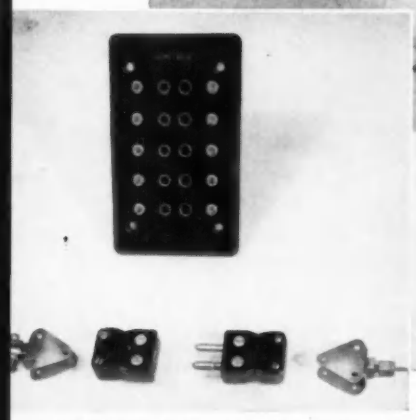
American Society of Tool Engineers, annual meeting and tool show, Convention Hall, Philadelphia, Pa. .....May 1-8

American Society for Metals, Southwest Metal Exposition and Congress, Dallas, Tex. ....May 12-16

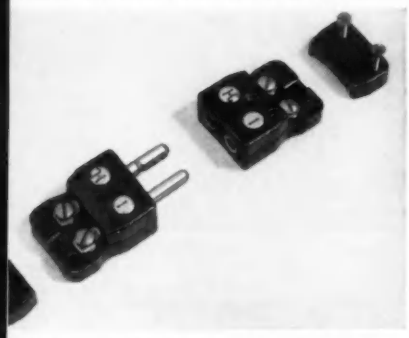
National Truck, Trailer and Equipment Show, Great Western Exhibit Building, Los Angeles, Calif. .....May 15-18



Quik-Konnect jacks and plugs are marked with identification of insert alloy. Plug points are of different diameters for negative and positive poles, to prevent improper connection.



The ***Quik-Konnect*** Components consist of (left to right) cable clamp, jack, plug, and tube connector, and (above) jack panel which can be mounted in conduit box or control panel.



Only the terminal cover at the rear of the connector need be removed during connection of wires.

Honeywell's new *Quik-Konnect** Thermocouple Components cut installation time 75%

. . . available through your HSM HONEYWELL SUPPLIES MAN

WITH these new *Quik-Konnect* Components you can make single, multiple or selective manual connection of a group of couples to an instrument. No handling of small parts. No confusing snarls of loose wire.

All assemblies are integral units. You can use them for quick extension wire connections in a laboratory or test cell, or for convenience and certainty of proper connections in permanent or semi-permanent installations.

Plug and jack assemblies have inserts or points made from the thermocouple alloys to which they should be connected. Available in four standard T/C combinations. For complete details, call your nearby HSM (Honeywell Supplies Man). He's as near as your phone; or write for S005-1 specification sheet.

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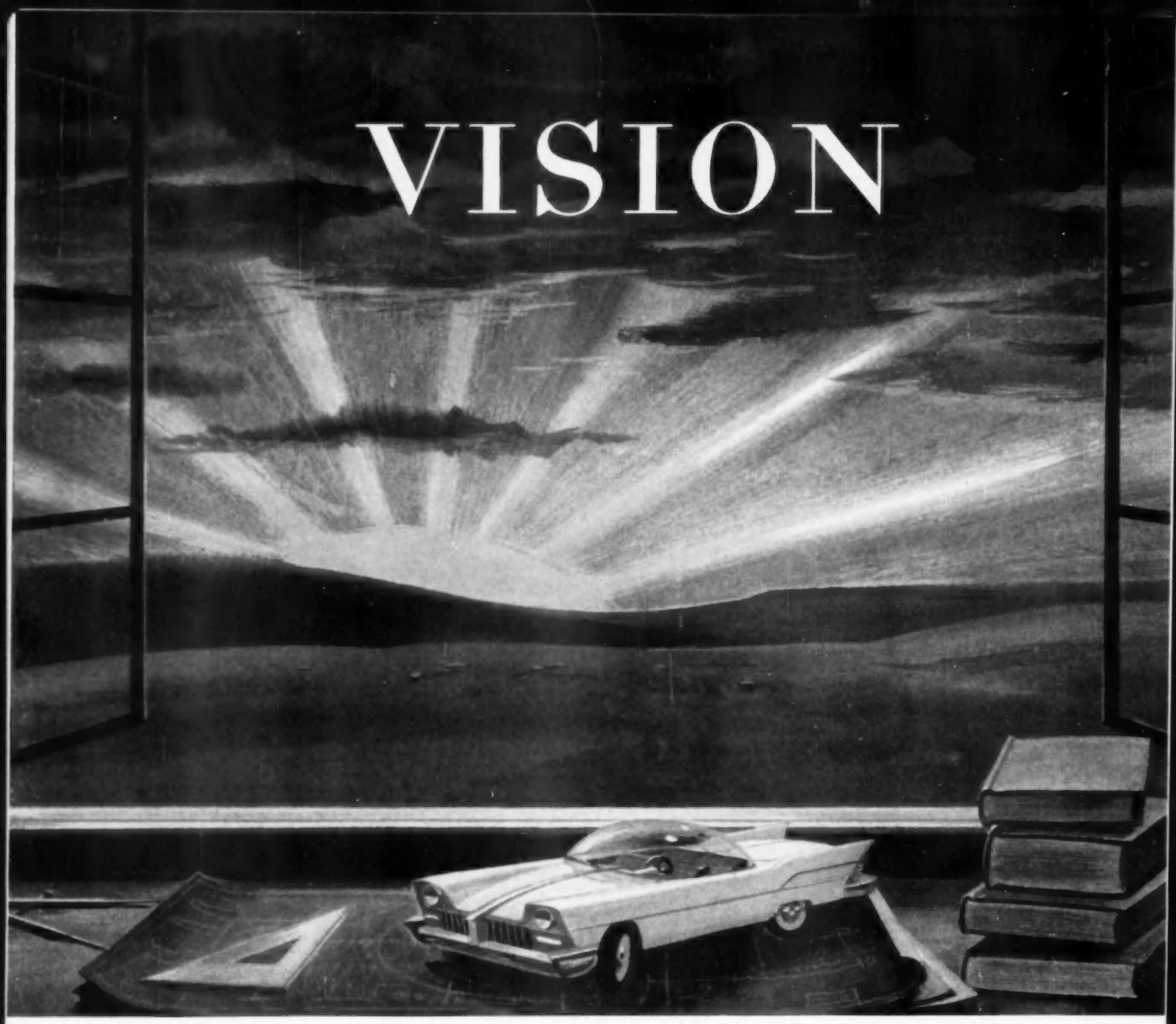

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Progress has been the keynote of the automotive industry. Today's achievements are but challenges for the accomplishments of tomorrow.

Over the years Bendix Products Division has contributed significantly to automotive progress. From four wheel brakes to power braking and power steering, Bendix has pioneered and developed many of the industry's most notable advancements.

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That's why the industry looks to Bendix* as a source of new ideas, as well as a volume manufacturer of automotive components.

*REG. U.S. PAT. OFF.

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High Spots of This Issue

SAE Annual Meeting

The results of the 1958 meeting of the SAE are summarized in this well-rounded report. Included are the highlights of 25 technical sessions; the engineering display, which featured the latest developments of leading automotive suppliers; and the more than 70 committee meetings. Page 48.

New Equipment at AC Spark Plug Plant

Details of an entirely new plant devoted exclusively to the manufacture of air cleaners and breathers are given in this article. The reader gets a close-up view of major equipment, such as press lines, assembly stations, and the conveyor system. Page 54.

Special Machine Anodizes Chevrolet Grilles

A new machine for anodizing Chevrolet aluminum grilles and headlamp bezels has been installed in the Chevrolet Press Plant, at Flint, Mich. The unit's principal features, as well as the sequence of steps in the anodizing cycle, are summarized here. Page 58.

Semi-Automatic Machine for Oldsmobile Engine Assembly

This article tells how a semi-automatic assembly machine for preparing basic engine sub-assemblies has increased production, improved quality, and reduced costs at Oldsmobile. Page 60.

Fully Automatic 1000-Hp Dynamometer

A fully automatic dynamometer provided with SR-4 instrumentation can record an entire family of performance curves in the time it takes to plot one curve on a conventional dynamometer. The machine, described here, was designed and built by Twin Disc Clutch Co. Page 63.

40 New Product Items And Other High Spots, Such As

Shock absorber shafts; Ford Sandusky plant, shock absorber production; farm equipment report; machinery news; metals; and industry statistics.

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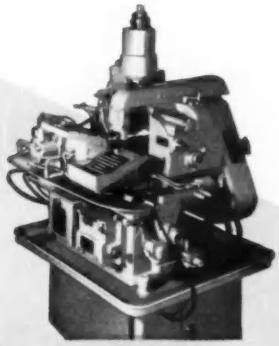
800 shafts per hour, straddle milled on one end. For this job a No. 1-18 Automatic employs an automatic reciprocating table cycle and two air-operated fixtures. Floor space for machine, 31½ sq. ft. Catalog No. M-1555-3.



Everything automatic on this No. 0-8 Automatic Rise and Fall Miller with tooling by Cincinnati. Production—123 shafts per hour. Floor space for machine, only 11½ sq. ft. Catalog No. M-1607-2.

Machine	000-4	0-8	1-18
Spindle drive	½ hp	1½ hp	3 hp
Table travel	4"	8"	18"
Table feeds	1 to 40 ipm	*½ to 20 ipm	¾ to 30 ipm
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*Two higher feed ranges optional for No. 0-8 machines.

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News

OF THE AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 118, No. 3 **February 1, 1958**

Ford Includes Edsel In New M-E-L Division

Ford Motor Co. has set up a new division to include the Edsel, Mercury, Lincoln and Continental passenger car operations as well as Ford's English car and truck sales in this country.

The new M-E-L Div. is headed by James J. Nance, vice-president and general manager. He formerly held the same position with the short-lived Lincoln and Mercury Div.

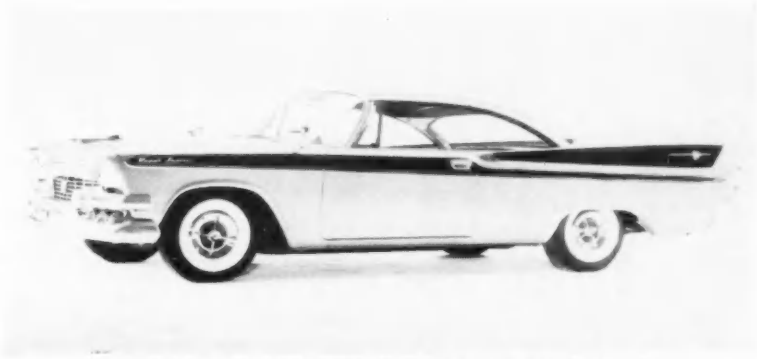
In announcing the new division, Henry Ford II said that the M-E-L Div. will be organized to provide "concentrated management attention to each of the five separate car lines while retaining the advantages and the efficiencies of a single top-level administration."

Richard E. Krafve, vice-president and general manager of the former Edsel Div., has been assigned to the staff of R. S. McNamara, group vice-president-car and truck divisions. Ben D. Mills, formerly vice-president and assistant general manager of the Lincoln and Mercury Div., will serve in the same capacity with the new division.

Mr. Nance said that separate sales organizations and field sales forces will be maintained for continuity and strength in merchandising all the cars of the division. He added that complete control of all manufacturing aspects of the domestic cars will be assumed.

It was believed, however, that Ford Div. will take over all manufacturing of the 1959 Edsel line for the M-E-L Div. The M-E-L Div. now builds the Thunderbird at its Lincoln plant at Wixom, Mich. for the Ford Div.

The 1959 Edsel reportedly will appear in three series instead of the current four, using a single Ford body for all three series. Currently there are two series in each body size, Ford and Mercury.



DODGE ADDS TWO-DOOR HARDTOP TO LINE

Newest addition to the 1958 Dodge passenger car line is the Regal Lancer, a luxurious two-door hardtop. The new model, a limited-production car, is painted in combinations of bronze and eggshell or bronze and ebony and features custom-crafted interiors, with the new Acousti-Foam headliner.

Edsel Div. was set up April 15, 1955 as the Special Products Div. and renamed Edsel Div. Nov. 19 of the following year.

On the heels of the organization of the M-E-L Div. came the announcement that Edsel sales during the first 10 days of January were 18.6 per cent higher than the first 10 days of the previous month. Preliminary figures for the second 10-day period of January indicated the same upward trend in sales rate, according to the announcement.

Stainless Steel Front End Considered For Use in 1960

An experimental automobile front end made entirely of stainless steel is being considered for possible use by 1960. The unit was displayed recently by the Committee of Stainless Steel Producers of the American Iron and Steel Institute.

The grilles and headlight doors are made of type 430 stainless steel and the bumper is made of type 201 stainless steel.

The exhibit also included a bumper of clad stainless—10 per cent type 302 stainless on two sides of mild steel. Such a bumper might prove less expensive because of the excessive time involved in buffing conventional bumpers, according to the Committee.

New Chevrolet Air Conditioner Fits Under Dash, Is Removable

Chevrolet has announced a new compact air conditioning unit that fits under the dash and can be removed for ready transfer to another car.

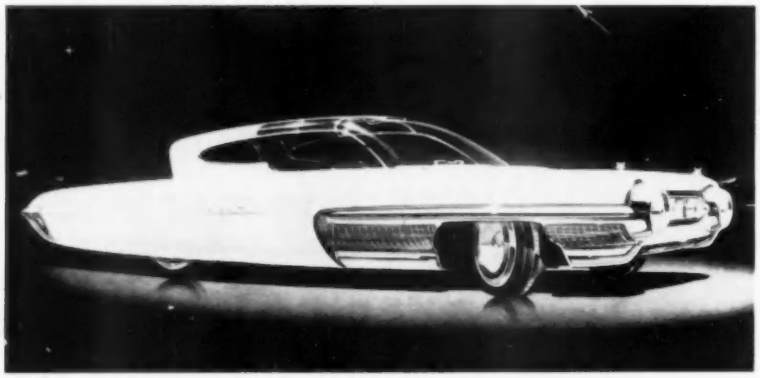
The unit, known as the Cool Pack, sells for approximately $300, plus dealer installation charges.

The cooling unit and fan console measures only 17 in. long and 8 in. wide. Separate compressor and condenser are beneath the hood. The complete installation weighs 104 lb.

The Cool Pack is designed to fit all 1958 Chevrolet passenger cars and certain light-duty Chevrolet trucks.

Temperature is controlled by a hot gas bypass valve. An electric clutch engages the compressor only when cooling is required.

News AUTOMOTIVE AND AVIATION



FORD UNVEILS ADVANCED STYLING MODEL

An electronic proximity warning device is among the operating features planned by Ford Motor Co. stylists for La Galaxie, a full sized advanced styling model. The car was displayed recently at the Chicago Automobile Show. It has an overall height of 51.8 in.; wheelbase, 126 in.; overall length, 223.6 in.; and width, 80.1 in. Butterfly roof sections would enable passengers to enter and leave the car with ease.

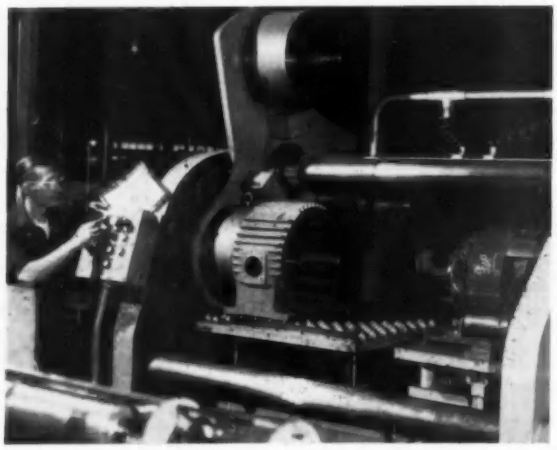
GE Official Predicts Big Rise In Sales of Electric Motors

Sales of electric motors and generators will rise 30 per cent—from $670 million to $870 million—in the next three years, according to James M. Crawford, vice-president and general manager of General Electric's Motor and Generator Div.

Mr. Crawford made this prediction at a press showing of a new, highly mechanized motor factory for production of 40 to 125 hp motors. The new facility which, including engineering and design, cost $7.5 million, is part of an expansion program under which GE invested more than $150 million in 1957.

Bryce W. Wyman, general manager of the small A-C motor and generator department of which the facility is a part, said that less than a third of the motors required in the 40 to 125 hp ratings today are standard types. For this reason, he said, the new facilities were designed to provide an economical answer to the manufacture of special types.

This answer was threefold, he pointed out, and it consisted of designing standardized parts that could be produced in volume and assembled in various combinations to meet a wide variety of requirements; designing the facilities at the same time as the product; and investing heavily in automatic materials handling equipment.



AUTOMATED PLANT

Stator assemblies are pressed into frames under 25 tons pressure in this specially designed machine at GE's new automated plant in Schenectady, N. Y. All frame sizes manufactured in the new facility can be accommodated by this press.

Borg-Warner Unveils Non-Spin Differential

The Warner Automotive Div. of Borg-Warner Corp. has unveiled a new spin-resistant automotive differential said to be readily interchangeable with existing conventional differentials.

The new unit is designed for use on passenger cars, trucks, tractors, construction machinery, military vehicles and industrial lift trucks. When one rear wheel has more traction than the other, the B-W unit automatically delivers the major portion of engine power to the wheel with the greater traction.

This, according to Borg-Warner, provides increased traction on snow, ice, mud and sand; reduces skidding on curves; diminishes swerving on rough or high-crowned roads; and prevents tire scuffing due to wheel bounce.

The new differential operates as a conventional unit when traction is equal at the rear wheels.

GM Engineers Use Model Car In Steering Control Study

Engineers on the General Motors Research Staff are using a miniature automobile controlled by servo mechanisms to study steering wheel responses to a driver's actions at the wheel.

The miniature car, on an automobile simulator complete with steering wheel, responds to the slightest actions of the steering wheel just as a real car would on the highway. Responses are measured on an electronic analogue computer which records them in detail.

The measuring device permits the engineers to compute data on automobile steering and controls systems before they reach the early design stage. The computer solves problems of lateral motion on the highway which result from steering wheel torque and driver-applied displacements.

Adjustment of controls on the computer permits changes in all car and tire characteristics, such as wheelbase, tire size, weight distribution, etc.

AMC Metropolitan Sales Set New Record in 1957

American Motors reports that sales of its English-built Metropolitan during 1957 totaled 12,226, highest since the car was introduced in 1954. First year sales of the small car were 7579, but in 1956 only 7323 were sold by U. S. dealers.

Mack, Alcoa Team To Build 27-Ton Aluminum Dump Truck

Mack has produced a 27-ton dump truck with a heated aluminum dumper that will carry 37.5 cu yd. The truck was built for Aluminum Company of America (with Alcoa aluminum) for use in the metals company's bauxite mining operations in the Dominican Republic.

Because of its lightweight box, the truck can haul 11,000 lb more than comparable steel-bodied trucks, according to Alcoa.

A special feature of the body manufactured by Heil Co. of Milwaukee is the heated dumper floor. Hot engine gasses are channeled into the hollow body to keep the dumper floor warm and facilitate handling of moist bauxite.

The giant truck is powered by a 335-hp turbocharged Diesel engine. First glimpse of the vehicle came at the Chicago Automobile Show.

Huge 27-ton dump truck has heated dumper floor

UAW Executive Board Proposes Profit Sharing, Wage Increases

The executive board of the UAW drafted a proposal for 1958 contract renewals that included a profit sharing plan for management, employe and consumer; a general wage increase; an increase in Supplemental Unemployment Benefits; pension and seniority improvements; and extension of SUB rights.

The proposals of the executive board were submitted to the union's convention in Detroit last month.

Within the union, several local leaders voiced concern that the international executive board's proposals had overlooked the short work week, long thought to be the major campaign issue at the upcoming negotiations.

The automobile companies announced general disagreement with the UAW proposals, indicating they would oppose strongly any such contract demands.

Hertz Announces Truck Orders Valued at $22 Million for '58

Hertz Rent-A-Car System has announced it will purchase 4000 new trucks during 1958 at a cost of $22 million. This will bring its total outlay for the current model year to $115.6 million.

The leasing firm said the trucks would be purchased mainly from Chevrolet, Ford, GMC, International Harvester, Mack and White. Orders will range from panel and pickup trucks to Diesel-powered units.

Two More Expansion Programs At Chevrolet Assembly Plants

Two more plant expansion programs have been planned for Chevrolet assembly plants serving midwestern states.

Contracts have been awarded for a 380,000 sq ft addition to the division's St. Louis assembly plant, which already covers a total area of 860,000 sq ft. Target for completion is Spring of 1959.

At Kansas City, Mo., preliminary plans have been made to expand the 1,125,000 sq ft plant, although no details have been revealed. Integration work at Kansas City could not begin until completion of the St. Louis plant addition.

Work already is underway on an addition to Chevrolet's Atlanta assembly plant.

The division is also planning an 82,200 sq ft zone office and warehouse building in Memphis, Tenn. to serve dealers in Arkansas, western Tennessee and northern Mississippi.

DIAMOND T INTRODUCES TILT-CAB VEHICLE

Diamond T's 900CHS series includes for the first time a tilt-cab vehicle equipped with an extra-heavy-duty gasoline or LPG power plant. GCW ratings for two-axle units is 65,000 lb, and for tandem rear axles, 76,000 lb. The Hall-Scott Spartan 6-cylinder engine, in either gasoline or LPG version, has a bore and stroke of 5 in. The gasoline model develops 239 bhp at 2800 rpm, and 501 lb/ft torque at 1600 rpm. Compression ratio is 6.7 to 1. The LPG engine develops 256 bhp at 2800 rpm; 530 lb/ft torque at 1600 rpm; and has a compression ratio of 8.7 to 1.

NEWS AUTOMOTIVE AND AVIATION

ARMY FUEL TRAIN CAN TRAVERSE RUGGED TERRAIN

This new fuel train built to go where conventional trucks cannot is able to traverse sand, mud, swampland, ice, snow, and other kinds of rugged terrain. Developed for Army's Transportation Research and Engineering Command by the Four Wheel Drive Auto Co., it carries 5000 gallons of fuel in ten huge rubber containers made by Goodyear Tire & Rubber Co. The big containers, each 5 ft high and 3½ ft wide, are mounted in pairs on FWD axle and towing assemblies equipped with filling, emptying and braking systems. Overall capacity of fuel train is limited only by pulling power of towing vehicle.

AMC Explains Why It Decided On Rear-Only Air Suspension

Weight distribution was the key factor in American Motors' decision to use air suspension on the rear wheels only rather than on all four wheels (see illustration).

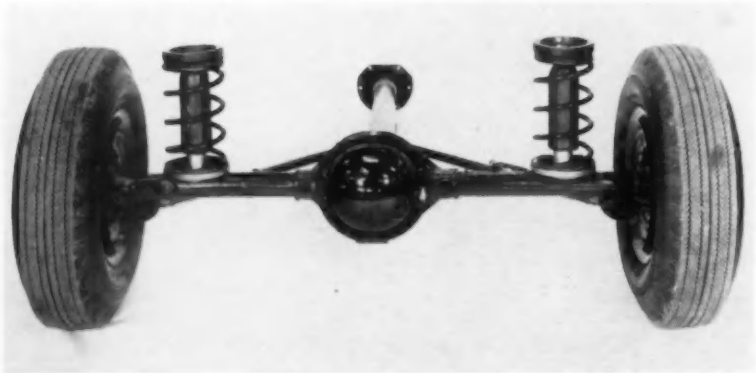
A study of weight distribution disclosed that, while curb weight leans slightly to the front wheels (about 55-45), the added weight of extra passengers and trunk load affects the rear springs much more critically than the front springs.

A 1957 117-in. wheelbase Rambler Ambassador with a moderate size V-8 engine distributes its curb weight of 3558 lb. 55.5 per cent to the front wheels and 44.5 per cent on the rear wheels. But when a 900 lb passenger load is added, only 31 per cent of the extra poundage goes to the front wheels and 69 per cent goes on the rear.

AMC engineers decided, therefore, that the leveling advantages of air suspension could be attained with air bags on the rear wheels only. The Rambler air suspension models use rear coil springs with a rate 30 per cent lower than the rates of Rambler's standard rear coil springs.

A Goodyear Rolling Lobe Air Spring was designed to fit inside AMC's rear coil springs. A leveling valve increases air pressure in the air spring when load exceeds 500 lb per steel spring.

AMC contends that its air suspension system is less complex and less expensive because of its rear-only application.



AMC OFFERS REAR WHEEL AIR SUSPENSION

American Motors low-priced air suspension system (see AI, Jan. 15, p. 34) combines air bellows and coil steel springs on the rear of the car. Cost of the system, called Air Coil Ride, will be $98.50. It will be available as an option on all AMC cars except the Rambler American.

Ford Div. To Begin Transfer From Buffalo to Lorain Plant

Ford Div. will begin this month to transfer operations from its Buffalo assembly plant to a new plant at Lorain, O. Passenger car assembly at Buffalo will cease Feb. 14, and the 27-year-old plant will be closed when tool and equipment transfer is completed.

Truck assembly will begin at the 1.8 million sq ft Lorain plant during the second quarter of the year and passenger car assembly after that. The Buffalo plant has not built trucks for several years because of lack of space.

Ford says its Buffalo plant has become "outmoded" for assembly of present-day automobiles. No plans have been made for disposal of the obsolete plant, although it is up for sale.

All of the 1260 employes involved in the Buffalo plant closing will be given an opportunity to transfer to Lorain, according to Ford. The Buffalo stamping plant, employing 4000, will continue in operation.

Meanwhile, it was expected that Ford soon would be ready to begin operations at new sections of its Atlanta and Chicago assembly plants, probably next summer.

AC Sets Sales Record in 1957, Sees Further Gains This Year

AC Spark Plug Div. sales in 1957 set a new record, topping by 3 per cent the best previous year, 1953. Sales also ran 7.5 per cent ahead of 1956.

The division anticipates further sales gains during 1958, particularly in replacement parts and defense products.

Gains during the year amounted to approximately 10 per cent in replacement items, 8 per cent in defense products, and 6 per cent in original equipment.

AI TABLOID

POWER PACKAGE

This new constant frequency power package, produced by General Electric Co. and weighing only 96 lb, is designed for use in high-speed aircraft. Called a turbonator, the device consists of a 24,000 rpm axial turbine on a common shaft with a high-speed alternator. It produces 40 kva at 400 cps. Either ram or compressed bleed air can be used as a driving medium.

Reynolds Piping Aluminum From New Reduction Plant

Reynolds Metals Company has tapped the first of three potlines at a new aluminum reduction plant at Sheffield, Ala. Part of the new reduction plant's output is going to Ford Motor Company's nearby aluminum foundry, now in partial operation.

Reynolds will have the second and third potlines in operation in the spring and early summer. Ford plans full production at its foundry with the beginning of 1959 model production.

The three new Reynolds potlines will have a rated capacity of 112,500 tons of molten aluminum a year, giving a total annual rate of 190,000 tons at the new and old plants. Ford expects to consume 32,000 tons when in full production.

Self-Adjusting Brakes Offered On Rambler Rebel, Ambassador

American Motors is offering self-adjusting brakes (Bendix) on its Rambler Rebel V-8 and Ambassador V-8. Cost of the optional feature is $7.45.

According to the company, the ratchet device is automatically engaged whenever the driver applies the brakes while in reverse. Adjustment is made automatically as needed.

B. F. Goodrich Chemical Co. and Algemene Kunstzijde Unie N. V. of Holland are forming a new company for the manufacture of special purpose synthetic rubber. A new plant will be built at Arnhem, Holland, with completion scheduled for mid-1959.

* * *

Allis-Chalmers Mfg. Co. will start construction sometime this year of a new laboratory for engineering, research, and development in Greendale, Wis.

* * *

North American Aviation, Inc. and Phillips Petroleum Co. are organizing a new company—Astrodyne, Inc.—that will specialize in the missile rocket power field. The new firm will have its headquarters and operations at Air Force Plant 66, near McGregor in Central Texas.

* * *

Martin Co. reports that it has achieved a self-sustaining nuclear reaction in the reactor core of the Martin Package Power Reactor at the company's zero power test facility. The portable reactor, which is about 9 by 9 by 30 ft in size, and ranges in weight from 6 to 15 tons, can be transported anywhere in the world by cargo planes.

* * *

As a result of a new surface alloying technique developed by Chromalloy Corp., it is now possible to use molybdenum at working temperatures of 2000° F and higher. The new process, called Chromalloy W-2, involves a diffusion of chromium into the surface, providing molybdenum with a high degree of oxidation resistance necessary for such high-temperature applications as gas turbine blades, ram jet flame holders, turbine wheels, missile combustion chambers, etc.

* * *

Shell Chemical Corp. will begin building early in 1958 two new multi-million dollar plants, at Norco, La., one to produce acrolein, the other to convert it to glycerine. Volume production of acrolein should lead to its use as a "building block" chemical in a variety of syntheses, the company says.

Minnesota Rubber Co. has purchased Park Tool Co. of Minneapolis, Minn., and will use the facilities to expand the capacity of its own Tool and Die Div.... A merger agreement between Summers Gyroscope Co. and Mercast Corp. has been approved by directors of both firms. The new company, to be known as the Summers Corp., will expand its activities in the missiles and aircraft field.

* * *

Titanium Metals Corp. of America has fabricated a light-gage plate of titanium said to be the largest of its kind ever produced. The plate, which measures 75 by 224 in., was produced in answer to requests from chemical process designers seeking a corrosion-resistant metal for large reactor vessels.

* * *

A Shell Development Co. research team reports that it has found a way to operate metal bearings at temperatures approaching 1000° F without the aid of conventional lubrication. Called "protective atmosphere lubrication," the new method involves the use of a small amount of hydrocarbon vapor, which attracts the oxygen in the air around the bearing surfaces; and extreme pressure additives, also in vapor form, which alloy with the metal to provide a lubricating film, and thus prevent scuffing.

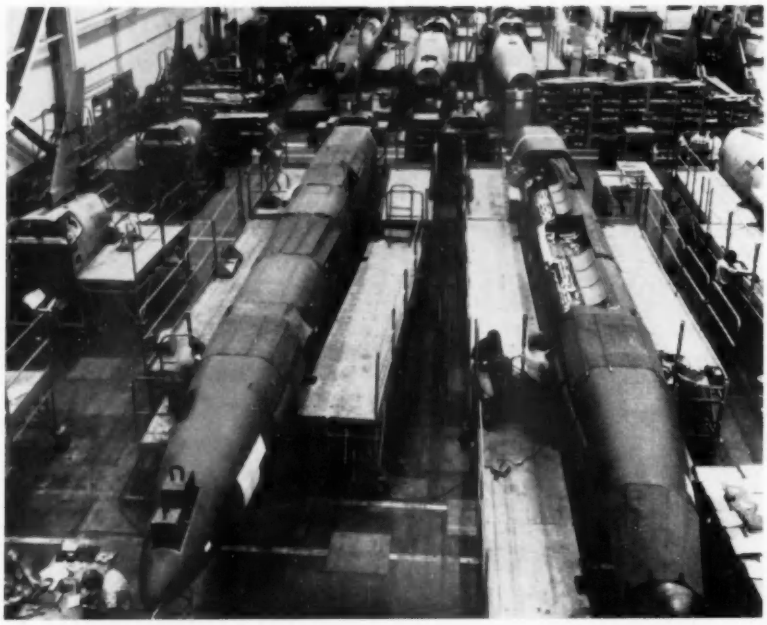
* * *

The Japanese government has approved a combination equity and licensing agreement between Clark Equipment Co. and Tokyo Umpanki Co., Ltd. The Japanese firm, believed to be the country's largest manufacturer of industrial trucks, will produce both Clark industrial trucks and the Michigan line of construction machinery.

* * *

High-strength gear, cams, levers, ratchets, and other precision parts can be moulded rather than machined by a new technique in powder metallurgy called Steelmet. Developed by P. R. Mallory & Co., the new process involves a carefully controlled series of thermal, physical-chemical and mechanical steps that eliminate expensive multiple pressing and sintering procedures.

AVIATION MANUFACTURING



SNARK PRODUCTION LINE IS SHOWN FOR FIRST TIME

Just released by the Air Force is this first photograph of the production line for the USAF-Northrop Snark Sm-62, the world's first intercontinental guided missile. Produced by the Northrop Div. of Northrop Aircraft, Inc., the Snark has a 5,000-mile range and can carry its nuclear warhead to the target with extreme accuracy. The Snark has been assigned to operational duty with units of the Strategic Air Command.

Boeing Reveals First Details Of New Intermediate-Range Jet

First details of the Boeing 720, a new intermediate-range jet airliner have been revealed by Boeing Airplane Co. Transport Div. The new plane is the third in the company's line of commercial jet aircraft.

The Seven-Twenty, which is powered by an improved version of the Pratt & Whitney JT3C (J57) engine, will have a top speed of more than 600 mph, and will be capable of carrying a gross payload of 33,000 lb over a maximum range of 2600 miles. It will carry up to 130 passengers in tourist-class accommodations and will operate economically over ranges as short as 150 miles, the company said.

The new airliner is the same size as the Boeing 707 Jet Stratoliner, but weighs 45,000 lb less. Structural weight is reduced in both wing and fuselage, company officials said; and a lighter-weight landing gear of the same type used in the 707 series—with dual-tandem main gear units—was used.

United Air Lines has ordered 11 of the new airliners and is scheduled to receive the first one in April, 1960.

Rocketdyne Building Center To Service Rocket Engines

A service center for ballistic missile rocket engines is being constructed by Rocketdyne Div. of North American Aviation, Inc., at Canoga Park, Calif.

The new center will support future Air Force units for Atlas, Thor, and Jupiter missiles. Rocketdyne produces liquid propellant engines for the three missiles.

The service center includes a corps of field engineers, a factory-to-field spare parts group, and an overhaul plant. Built at a cost of $1.5 million, it will provide 132,000 sq ft of factory and office space. Completion is scheduled for late 1958.

GE Commercial Jet Engine Passes 1000-Hour Test

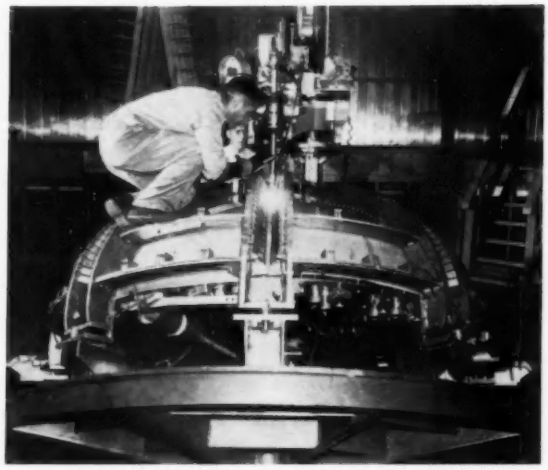
General Electric's commercial jet engine, the CJ-805, has successfully passed the acceptance test for commercial powerplants—a 1000 hour operation simulating 600 individual airline flights.

Flights from 375 miles long to 1235 miles were simulated during the test, which was carried out during the past four months, the company said.

The CJ-805, a commercial version of the company's J79 military engine, is rated in the 10,000-lb thrust class. Company officials said that it will power the Convair 880 jet airliner as well as other airliners still in development.

TITAN ICBM

Described as the largest precision welding tool installation ever engineered in this country, the unit shown is turning out parts for the Air Force's Titan ICBM. A special fixture holds "orange peel" aluminum sections as they are joined by heliwelding, an inert gas arc-welding process. The sections form part of the Titan fuel tank. The equipment, now at Martin Co.'s plant in Denver, was designed and engineered by Air Reduction Co.



Convair Gets AF Contract To Study Use of Titanium

Convair Div. of General Dynamics Corp. has received an Air Force development study contract to investigate the use of newer titanium alloys in high-speed aircraft and missiles.

The contract, which totals $1,388,044, calls for an 18-month study program to be started early this year.

B. F. Coggan, vice-president and manager of Convair-San Diego, said that the study's prime purpose is to determine how adaptable the new alloys are to future weapons systems.

Titanium, a temperature-resistant material, has been in production use at Convair ever since it was introduced commercially.

Coggan said the Convair titanium study will be divided into five major phases: Selection of parts made of titanium alloys, which will offer the greatest benefits to the Air Force; selection of the three most promising alloys from titanium manufacturers; development of new production techniques; fabrication of parts; and testing of parts.

Air-Breathing Engine Seen As Missile-Launching Device

Air-breathing engines like the turbojet will play an important role in the development of space flight and ballistics missiles, according to a General Electric Co. official.

John B. Montgomery, general manager of GE's Aircraft Gas Turbine Div. said that turbojets will make excellent first-stage engines for launching ballistic missiles and space vehicles. "Once the missile or space vehicle has been accelerated through the dense layers of air near the earth's surface, the rocket engine would take over the job of propelling it the rest of the way," he explained.

Mr. Montgomery listed the following advantages of air-breathing boost units: They are recoverable and can be used over and over again; they have excellent mobility, thus allowing a wider dispersal of launching sites; and they require much simpler launching sites than the elaborate structures being built for ballistic missiles today.

Mr. Montgomery said that with present advances in turbojet technology such an air-breathing boost for launching missiles could be developed within the next few years.

"Within the next few years we anticipate a series of major advances in flight and space propulsion," he said. "Not all of these can be talked about for reasons of national security, but it is known that General Electric is working on the application of new exotic fuels and nuclear propulsion for aircraft, and on advanced engines."

INSTRUMENT BOOM USED IN FLIGHT TESTING F-104A

Six-ft instrument boom, shown protruding from nose of Lockheed F-104A, is used in flight-testing the ultrasonic plane. Airspeed is measured through a center opening at the end of the boom, and pitch and yaw angles by T-shaped indicators. Note the large pylon fuel tanks suspended from the wings.

Battelle Official Predicts Wider Use of Molybdenum

Development of a new family of metal-ceramics involving wide use of molybdenum is predicted by a Battelle Memorial Institute official.

Dr. Clarence H. Long, Battelle technical director, says that the boundry between metals and ceramics will become much less distinct in the next 25 years with the emergence of a new family of materials based on intermetallic compounds.

"There will be further development of cermets; that is, bodies made up of predominantly small particles or fibers of refractory, (ceramic type) materials held together with ductile metal acting as a cement," he said.

"On the other hand," he continued, "research on the dispersion hardening of metals is leading to the development of predominantly metallic bodies in which hard refractory particles are dispersed."

Dr. Lorig also forsaw wide use of molybdenum, tungsten tantalum, and columbium base alloys both in composite structures with ceramics and in all-metal structures, with molybdenum the most highly developed and commonly used.

He asserted that improved ductility and elevated-temperature strength will come about largely as a result of better theoretical understanding of the solid state rather than through the trial and error methods used today.

MEN IN THE NEWS

Chrysler Corp. — John D. Leary has been elected vice-president - personnel, succeeding Robert W. Condor, who has assumed new responsibilities as a vice-president.

Lincoln & Mercury Div., Ford Motor Co.—**Bruce E. Miller** has been named Lincoln advertising manager, succeeding **Joseph J. Seregny.**

General Electric Co., Metallurgical Products Dept.—**Robert A. Slater** has been appointed manager of manufacturing engineering; **William K. Cordier,** manager of diamond pilot plant operations; **James T. Blovich,** specialist—market development administration; and **N. A. Mathews,** manager of diamond engineering.

Westinghouse Electric Corp.—**R. E. Kirby** has been appointed manager of electronics operations in Baltimore, Md., and **J. M. Beggs** succeeds him as manager of the ordnance department.

Associated Spring Corp.—**Franz P. Zimmerli,** director of research, has retired; and he is succeeded by **H. Perry Smith.**

American Bosch Arma Corp.—**Ernest M. Riggleman** is now vice-president and division manager at American Bosch Arma Mississippi Corp.

Wheelabrator Corp. — **James F. Connaughton** has been elected president, succeeding **Otto A. Pfaff,** who will continue as chairman of the board.

E. W. Bliss Co., Canton Div.—**James E. Paumier** has become general superintendent.

Gisholt Machine Co. —Robert H. Bruce was appointed general sales manager, succeeding C. J. Baxter, retired.

Ex-Cell-O Corp.—Robert W. Ford has been made sales manager of Machine Tool Div., and Herbert A. Knack has become sales manager of Continental Tool Works Div.

Bendix Aviation Corp.—**Winston E. Kock** has been named general manager of the Research Laboratories division in Detroit; **Charles Edwards,** assistant director in charge of technical activities; and **Gerald A. Rosselot,** assistant director in charge of administration.

Sperry Rand Corp.—**K. R. Herman** and **C. G. Holschuh** were elected executive vice-presidents.

Vickers, Inc.—**J. F. Forster** has been elected president.

Joseph T. Ryerson & Son, Inc.—**Robert T. Harvey** was appointed national product manager with responsibility for the marketing of aluminum.

Bliss & Laughlin, Inc.—**Eugene G. Sheasby** has been appointed general manger of sales.

Fruehauf Trailer Co.—**Edward R. Neumann** was named manager, Missile Products Div.

Alan Wood Steel Co.—**Robert A. Lubker** was made director of research.

Fuller Mfg. Co., Transmission Div. —**J. A. Packard** has been promoted to general sales manager, and **L. C. Butler** is now assistant to the general sales manager.

Motor Wheel Corp. —Raymond J. Wilcox was elected executive vice-president.

Raybestos - Manhattan, Inc.—S. R. Zimmerman, Jr. has been named general manager of the U. S. Asbestos-Grey Rock Div.

International Harvester Co. — **Dan Chimenti** is the new director of manufacturing, succeeding the late **Ralph C. Archer.**

Borg-Warner Corp., Long Mfg. Div. —**Howard E. Blood, Jr.,** has been promoted to director of industrial relations and public relations.

Warner Electric Brake & Clutch Co.—**Edward A. Cleary, Jr.,** has been elected vice-president in charge of the manufacturing division.

Minneapolis-Honeywell Regulator Co., Davies Laboratories Div.—**John G. Booth** has been appointed general manager.

Timken Roller Bearing Co.—**George T. Humphrey, Jr.,** has been named general manager of the Service-Sales Div.

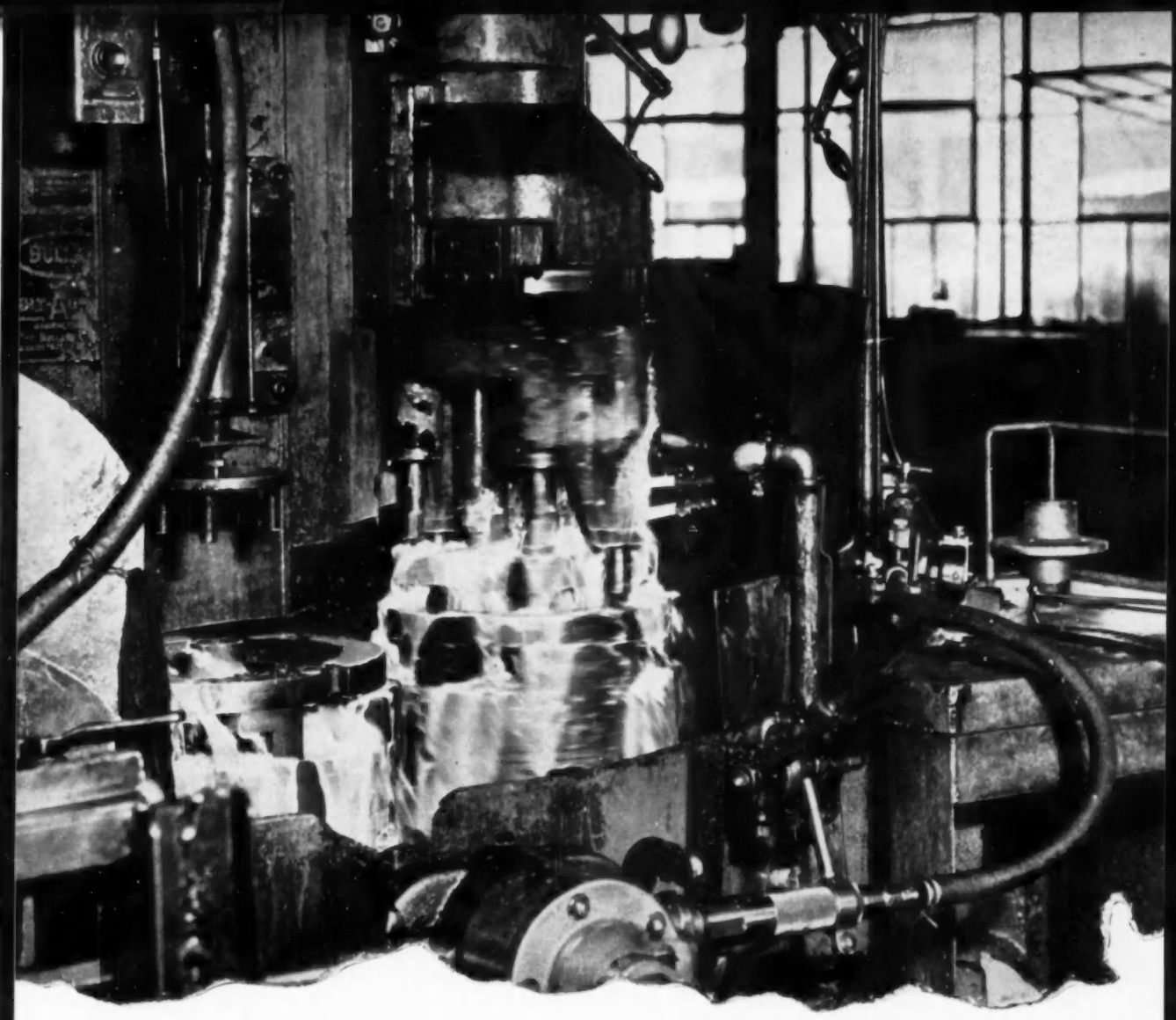
Necrology

Dr. Willis R. Whitney, 89, founder and former director of the General Electric Research Laboratory, died Jan. 9, at Schenectary, N. Y.

Serge E. Gluhareff, 54, a pioneer designer of amphibious planes and helicopters and former assistant engineering manager of Sikorsky Aircraft Div. of United Aircraft Corp., died Jan 9, at Newtown, Conn.

John H. Victor, 75, founder and chairman of the Victor Mfg. and Gasket Co., died recently, at Wilmette, Ill.

Wilfred C. Leland, 88, noted pioneer in the automobile industry, died Jan. 17, at Detroit, Mich.



Don't let RUST eat away your profits

Rust in a valuable machine tool or on finished parts can sometimes cost you thousands of dollars—and it's often difficult to prevent. But it *can* be prevented. Proved in the field and constantly improved for more than 30 years, Texaco Soluble Oils have shown that they give full protection against rust.

In addition, Texaco Soluble Oils have excellent cooling and other properties—assuring longer tool life. They keep machines cleaner, emulsify readily with water, remain stable, and assure freedom from odor problems.

These are some of the reasons for machining with Texaco. And there are many others. Your local Texaco lubrication representative will be glad to give you the complete details and help you select the proper coolant from a full line of Texaco Cutting, Grinding and Soluble Oils. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

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LUBRICATION IS A MAJOR FACTOR IN COST CONTROL

(PARTS, INVENTORY, PRODUCTION, DOWNTIME, MAINTENANCE)

how ARMASTEEL
wider scope of

NEW PRODUCT DESIGNS POSSIBLE . . . Due to their unusual physical properties, high machinability ratings, and wide latitude of design, ArmaSteel castings are replacing other materials in today's products. Being a casting material, ArmaSteel can be formed in shapes too complex for the forging process. With ArmaSteel castings, low draft angles, intricate coring, and close dimensional tolerances are possible. Less stock remains to be machined. High tensile strength, damping qualities, and other physical and chemical characteristics are also major factors in ArmaSteel's popularity among product design engineers.

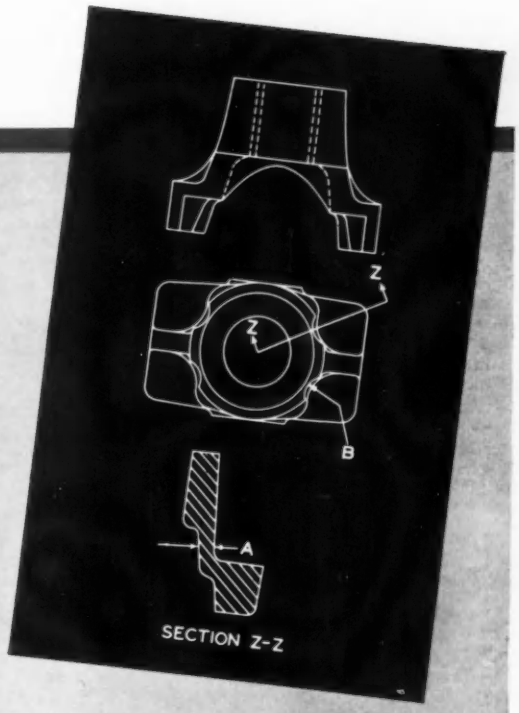
ARMASTEEL IS A PEARLITIC MALLEABLE IRON, possessing many of the physical characteristics of forged low-carbon steel. Because of carbon nodules in the pearlite matrix, the machinability of ArmaSteel castings is 58% better than S.A.E. 1040 steel and compares favorably with S.A.E. 1112. ArmaSteel is produced in three ranges, with tensile strengths from 70,000 psi to 100,000 psi, yield strengths from 48,000 psi to 80,000 psi, and elongations (in 2") from 2% to 4%. Because of these excellent properties, and because it can be either sand cast or shell cast, ArmaSteel provides improved parts for many products, at the same time that it lowers costs. On these pages are two case histories of products that have benefited from ArmaSteel castings . . . perhaps your product can benefit too.

CAST ARMASTEEL IMPROVES AN AUTOMOBILE DIFFERENTIAL CASE

This case forms the support for the driving gears in an automobile. The demands made of such a part are that it be of high strength, that it have the least possible deflection, and that—because it is part of the car's unsprung weight—its weight be held to a minimum to help the riding characteristics. The part must be cast because it is impossible to forge the internal cavity.

ARMASTEEL 86M MET ALL THESE DEMANDS. It has a tensile strength of 70,000 psi, a yield strength of 48,000 psi, and a Brinell Hardness No. of 163-207. Deflection is very low, and ArmaSteel absorbs vibrant energy, thus contributing to quiet operation. The cast ArmaSteel part also allowed the manufacturer to eliminate thrust washers on the pinion gear bearings, reducing costs.

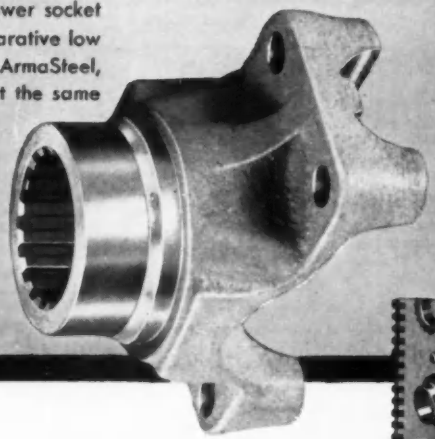
castings allow new and much design



CAST ARMASTEEL REPLACES FORGINGS IN THIS COMPANION FLANGE BECAUSE OF SPACE LIMITATIONS

This part was formerly a medium carbon steel forging. During a re-design of the unit, it was impossible to get the desired strength by enlarging the part, because of design limitations. It became apparent that the draft angles necessary in the forging would not allow proper thickness of metal at point "A". Only a casting could achieve the low draft angles needed, and only a high strength material could meet the design requirements.

CASTINGS OF ARMASTEEL 84M PROVIDED THE ANSWER. ArmaSteel 84M has an ultimate tensile strength of 100,000 psi, and a yield strength of 80,000 psi. ArmaSteel parts tested showed a long fatigue life and minimum deflection under the extreme stress involved. In addition, castings offered a reasonable cost per piece, excellent machinability, and uniformity in production lots. In broaching the spline in the center hole, the manufacturer found that ArmaSteel castings resulted in greatly improved broach life. Draft angles were reduced to 2°, which allowed sufficient clearance (point "B") for the power socket wrench assembly operations. Thus, due to the comparative low cost of castings and the reduced machining costs of ArmaSteel, the manufacturer enjoyed an overall saving and at the same time solved his design and assembly problems.



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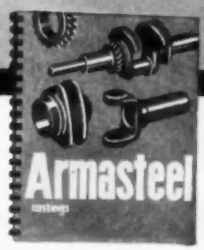


For further information on physical properties and applications of ArmaSteel, write for our complete catalog. Descriptive literature is also available on our shell mold and sand casting processes.

CENTRAL FOUNDRY DIVISION · GENERAL MOTORS CORPORATION

CENTRAL FOUNDRY DIVISION

GENERAL MOTORS CORPORATION • SAGINAW, MICHIGAN • DEPT. 24

MORE EFFICIENT DESIGN, IMPORTANT SAVINGS, SIMPLIFIED ASSEMBLY, BETTER APPEARANCE

These are some of the many benefits reported by Design Engineers who have adopted TRU-LAY PUSH-PULLS for remote control operations on literally hundreds of products

Here are typical comments recently received from equipment manufacturers whose machines or implements are equipped with these accurate and dependable remote controls:

Saves Time, Labor and Material
"The use of your flexible Push-Pulls saves us a great deal of time, labor and material. The old linkages frequently required much planning in both engineering and shop which is not required now. On some of our equipment we use Push-Pulls from 10 to 30 feet in length. They operate clutch controls on the Main Power Unit, Feed Conveyors and Delivery Conveyors."

Greater Flexibility of Design
"The principal advantage of Tru-Lay Push-Pulls in our application is that they permit flexibility in locating the control valve in relation to the operator's position."

Cost Less to Install
"Tru-Lay Push-Pulls are easier and less expensive to install than linkages for remote control of power take-off, brake and clutch. Better appearance, too."

Simple and Neat
"For several models of farm tractors, we selected your controls for their simplicity and neatness of application as governor controls."

Solution to Tough Problem
"Can be installed where straight rods are impossible . . . for Remote Control of transmissions, brakes and clutches."

Eliminates Maintenance
"Simple operation and elimination of maintenance problem are the major advantages in using your Push-Pulls."

Reduces Number of Parts
"Your Push-Pulls have eliminated links, radius rods and other lost-motion devices for remote control of hydraulic valves."

Provide ACCURATE Control
"Tru-Lay Push-Pull control cables provide minimum back-lash, even in installations up to 30 feet in length, because the cable is designed to close tolerances with minimum drag and lost motion."

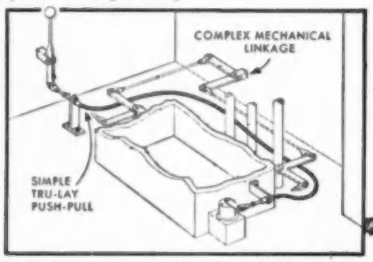
• • •

TRU-LAY PUSH-PULLS are "Solid as a rod but *Flexible* as a wire rope." This flexibility makes it possible to snake around obstructions . . . permits the ideal arrangement of all elements of remote controls.

***Advantages** of Tru-Lay Push-Pull flexibility and simplicity are pictured below—*

Simplicity vs Complexity

Compare the TRU-LAY PUSH-PULL cable in illustration with the mechanical linkage. PUSH-PULLS are simple, have but one moving part, are noiseless and give lifetime service accuracy. Linkages are complex, made of many parts; they wear at many points. Their use brings increased backlash, lost accuracy and vibration rattles.



Construction Equipment and **Farm Implements** provide good examples of the wide-spread use of these accurate, simple and dependable Push-Pulls. On Power Shovels, Winches, Graders, Road Oilers, Dump Trucks, Snow Plows, Engine-driven Pumps, Crushers, Tractors, Combines, Corn Pickers, Corn Row Sprayers, Corn Detasslers, Orchard Sprayers, Power-driven Tree Trimmers, Tobacco Picking Machines and others . . .

TRU-LAY PUSH-PULLS are operating unfailingly for the remote control of Hydraulic and Air Valves, Brakes, Clutches, Transmissions, Throttles, Chokes, Governors, Power Take-Offs, Spray Nozzles, Vent Directional Fins and on many other applications.

ACCO *Our DATA FILE will answer all further questions*

AUTOMOTIVE and AIRCRAFT DIVISION
AMERICAN CHAIN & CABLE

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There is No Worry about Failures or Maintenance Costs with TRU-LAY Push-Pull Remote Controls

Long Life is a matter of record. We have never heard of a Tru-Lay Flexible Push-Pull Control wearing out in normal service. Failures, that sometimes harass users of more complex controls, are eliminated by the use of these simple, positive-action controls.

Dependable Operation of these controls is a certainty, even under the most adverse conditions . . . HOT as jet engines (note: Tru-Lay Push-Pulls are actually performing on hot jet applications) . . . COLD to 70° F below zero . . . SOAKIN' WET . . . ABRASIVE . . . or just plain TOUGH.

Freedom from Trouble is assured because of such features as . . . full protection of the inner, working member by the tough flexible conduit . . . lubrication of the inner, working member *for life* during assembly . . . seals that keep moisture, dust and other foreign matter out of the unit . . . cold swaging of fittings that makes them integral parts of the control unit.

Accuracy is inherent in the basic design of Tru-Lay Push-Pulls. They are precision products, not gadgets.

Capacity ranges from light jobs up to jobs of 1,000 lbs. input. These Push-Pulls will handle jobs 150 feet or more from the control point.

"Solid as a rod, Flexible as a wire rope" aptly describes Tru-Lay Push-Pull Controls. This flexibility provides positive, remote action whether anchorages are fixed or movable . . . it damps out noise and vibration . . . it greatly simplifies installation of controls by reducing the number of working parts and by making it possible to snake around obstructions.

Adaptability to all sorts of mechanical situations explains, in large measure, the wide-spread application of Tru-Lay Push-Pulls. Standard anchorages, fittings and heads have been designed that meet requirements on approximately 80% of the installations. Simple modifications of these standards, or minor changes in your own design, cover almost every special situation. Our engineers have the know-how on such matters, and will work with you.

For Further Information—The DATA FILE pictured at the left contains six booklets and bulletins that will answer any further questions you may have about this versatile and dependable tool. It is quite likely that this material will point the way to a simplified solution of your remote control design problems. Write for a copy.

The FEDERAL DIMENSIONAIR

No adjustment diddling. Set this gage quicker than you can set your watch. Once set, it *stays* set! *It can't drift.*

No need to keep a stockpile of dials. This 7½" *accurately calibrated, all-usable* scale will answer every normal gaging need. Operator cannot change magnification or monkey with your tolerance specifications. Dimensionair is foolproof. To meet the occasional finer or coarser measuring requirements, other magnifications are available.

NOTE: Accurate setting is guaranteed with one master. However, the Dimensionair can be used equally as well *with two* if your standards so specify.

Finger tip attachment. *Longer approach range* lets you see where you are going. *Greater plug clearance* for faster, easier gaging — less wear: No scoring or jamming, *greater exploration* of out-of-round, taper, irregularities. No centralizing error. Deep-set air jets give *longest useful life;* large and *self-cleaning jets* clean work while they gage.

With this air gage you will measure

More Accurately

More Dependably

Faster
(Greater Plug Clearance)

With Less Maintenance Cost

With Less Dependence on Skilled Help

than with any other air gage you can buy!

This is a statement we are ready to prove. Don't take our word for it. *Try* the Dimensionair on a "no-strings-attached" trial basis. Mail the coupon today.

Ask FEDERAL *First*

FOR RECOMMENDATIONS IN MODERN GAGES . . .

Dial Indicating, Air, Electric, or Electronic—for Inspecting, Measuring, Sorting, or Automation Gaging

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OK Prove it! ***Let us try a DIMENSIONAIR***

Name .....

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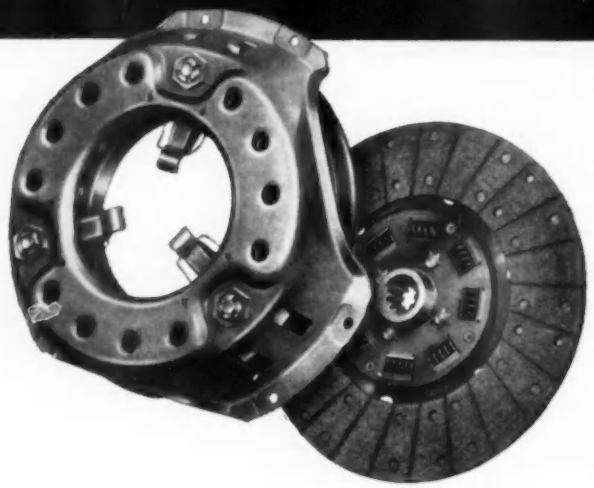
Now, a LIPE 12" heavy-duty Direct Pressure Clutch



FIRST in the entirely new Lipe DPB Line...

featuring:

- **Maximum mechanical efficiency!**
- **Optional needle-bearing linkage!**
- **Stronger, lighter stamped cover!**
- **Full ventilation for cooler running!**
- **Fade-resisting chrome silicon springs!**
- **Spring heat-insulating washers!**
- **Lower pedal load!**
- **Competitive price!**

Here's the first in a new series of Lipe direct pressure clutches to supplement the already-famous DP Line! With the introduction of the new 12" DPB single and two plate, Lipe direct pressure clutches are available for all applications involving gross vehicle weights of 19,000 lbs. and up. Additional DPB models in 13" through 15" single and two plate sizes will be available soon.

The new Lipe 12" DPB clutch is interchangeable with many other models and is easily adapted to any present vehicle requirements. Improved design, a simpler, sturdier internal lever system, and Lipe's precision manufacturing and testing assure you extra clutch mileage in your vehicles.

WRITE or WIRE for an Engineering Data Sheet on the Lipe 12" DPB—or for first-hand information request that a Lipe Field Engineer call on you at your convenience.

LIPE ROLLWAY

Lipe-ROLLWAY CORPORATION
SYRACUSE 1, N. Y.

"...AND WEIRKOTE® CAN DO AWAY WITH PLATING OR DIPPING AFTER FABRICATION! IT WON'T PEEL OR FLAKE."

Q. A zinc-coated steel that won't peel or flake? That could save us a lot of money every month. Just what makes this Weirkote so special?

A. It's made by the continuous process, you know, which integrates zinc and steel so that the toughest fabrication won't break down the bond. You can work Weirkote to the very limits of the steel itself.

Q. Of course, that means the most complicated parts would have protection against rust. I like what I'm hearing. Is there more?

A. Yes . . . now Weirkote is treated to inhibit wet storage stain (white oxide). To make a long story short, I'd say this: With Weirkote, you can turn out a better product at lower cost. And you can free a lot of the capital, floor space and time you have tied up in plating operations.

Send for free booklet that details the time- and cost-saving advantages of skin-tight zinc-coated Weirkote. Weirton Steel Company, Dept. T-7, Weirton, West Virginia.

WEIRTON STEEL COMPANY

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Timely Engineering Subjects Discussed

William K. Creson, 1958 SAE President

AIR SUSPENSION SYSTEMS in 1958 automobiles, noise reduction, and new aircraft materials were but a few of the many major subjects discussed at the Annual Meeting of the Society of Automotive Engineers. Each of the 25 technical sessions covered some phase—and in a number of cases several phases—having to do with automobiles, motor trucks, airplanes, helicopters, and farm tractors. These phases included, in addition to those mentioned, such topics as automatic transmission seals, bearings and bearing lubricants, fuel studies, exhaust gas analysis, smaller cars, and trends in farm tractors. Also plating improvements, motor truck performence and cab design, operation of aircraft, and foreign design and production developments—without an attempt to be all-inclusive. The technical program of the meeting, held in Detroit the week of January 13, altogether encompassed the presentation of 59 papers and 3 panel discussions.

Besides the technical sessions, the program comprised the annual business session; a luncheon meeting of the Production Activity; and the annual banquet held at Detroit Masonic Temple. It also entails more than 70 separate administrative, activity and technical committee meetings. Another outstanding feature was SAE's engineering display, where the products and services of a considerable number of component and material suppliers were exhibited.

It can be seen the overall program was both comprehensive and diversified. As could be expected, it attracted an attendance approaching 6000—despite some current "austerity."

The election of SAE's 1958 officers was announced at the annual business session. The new president is William K. Creson, consulting engineer, Ross Gear & Tool Co., Inc. B. B. Bachman, director of engineering, Autocar Div., White Motor Co., was re-elected treasurer. The vice presidential electees who will represent the activities in 1958, and new councilors elected for the term 1958-1959, are given, in addition to those just named, in the accompanying list.

General Alfred M. Gruenther, president of the American National Red Cross and former commander of NATO, was the principal speaker at the annual banquet. The subject of his talk was "Some Aspects of Our Security Problem." He called for intensive defense effort on three fronts—military, economic and psychological—placing emphasis on the latter two. Militarily—in retaliatory strength—the Free Nations have, he indicated, a capacity which discourages aggression and which should not be written off when evaluating Russia's launching of earth satellites. But more can be done in the important economic and psychological fields, he stated. General Gruenther urged that full support be given the Government in expanding Defense in not only one, but all three of these vital areas. We are going to be living in a period of tension for quite some time, he predicted, in telling the SAE members they could ease the situation by being leaders in calming the "hysteria" and by contributing to all phases of the nation's defense.

Andrew A. Kucher, vice president of engineering and research, Ford Motor Co., discussed "Production—Today and Tomorrow" at the luncheon meeting of the Production Activity. In speaking about produc-

at SAE Annual Meeting

By Charles A. Weinert

tion in the long-range future, he saw no "pushbutton utopia where machines will do all our work." There will be an "enormous increase in productive capacity" and this will call for an expanded labor force made up mostly of professionally trained men and both semi-skilled and skilled workers to handle the "more technically complex future processes." Mr. Kucher also commented on public uncertainty as to the quality of our national scientific efforts, as initiated by the "sputnik." He said that we possess the finest array of technical talent in the world, both qualitatively and quantitatively, and that "what appears to be overwhelmingly complex is really basically simple and requires only the solidification of objectives, organized and coordinated programs, and the effective application of our enormous technical reserves."

ENGINEERING DISPLAY

SAE'S ENGINEERING DISPLAY this year featured the latest product and component developments of leading automotive suppliers. The following new items of equipment were among the large array exhibited in 90 booths by the 78 participating companies:

Bendix Products Div., Bendix Aviation Corp., showed the new OCM brake developed for the Ford Thunderbird. The lining of the primary shoe of the brake is segmented into three parts. The larger upper and lower portions are of molded brake lining material, while the central segment is of Cerametalix about ⅜-in. long. Effective prevention of fading under repeated high-speed operation is said to have been achieved by this combination and arrangement of lining materials.

Aluminum Co. of America exhibited a considerable number of aluminum applications in automotive components, such as grilles, trim wheels, housings, pistons, cylinder blocks, etc. An interesting item shown was a Frigidaire axial air-conditioning compressor of 12.2 cu in. displacement and rated at five tons. This unit is belt-driven by the engine through an electro-magnetic clutch, allowing disconnect of the compressor when operation is not desired. Its six pistons are connected by individual rods terminating in ball sockets in a forged aluminum wobble plate. This was said to be the sole current application of forged aluminum in the automotive industry. Another interesting item in this exhibit was a cutaway of a small engine cylinder block of aluminum whose cylinder wall had been coated with a metallized spray of molybdenum about 0.004 to 0.005 in. thick for wear resistance.

Ross Gear & Tool Co., Inc., featured its new HPS semi-integral type power steering gear (AI, September 15, page 65), and variable-ratio steering. The latter design provides a slow ratio in the straight-ahead position for road stability and fast ratios at the ends of the cam (worm) for quick cornering.

Leece-Neville Co. had on display a recently-developed alternator-rectifier unit in which six silicon diodes are mounted around the slip ring end of the alternator. The advantages of this combination, as compared with the older separate selenium rectifier, include reduction of wiring and elimination of the need for finding a mounting location where air blast is available for cooling.

Continental Motors Corp. showed a model of the

SAE OFFICERS for 1958

President

William K. Creson, Ross Gear and Tool Co., Inc.

Treasurer

B. B. Bachman, Autocar Div., White Motor Co.

Vice-Presidents

Air Transport—C. M. Christenson, United Air Lines, Inc.
Aircraft—H. W. Holzapfel, AiResearch Aviation Service Co., Div., Garrett Corp.
Aircraft Powerplant—C. E. Mines, Allison Div., General Motors Corp.
Body—E. J. Premo, Chevrolet Motor Div., General Motors Div.
Diesel Engine—L. D. Thompson, Utica-Bend Corp., Sub., Curtiss-Wright Corp.
Engineering Materials—E. S. Rowland, Timken Roller Bearing Co.
Fuels and Lubricants—R. Wayne Goodale, Lubricant Div., Standard Oil Co. of Calif.
Passenger Car—P. H. Pretz, Ford Motor Co.
Production——J. E. Adams, White Motor Co.
Tractor and Farm Machinery—Merlin Hansen, John Deere Research and Engineering Center.
Transportation and Maintenance—E. B. Ogden, Consolidated Freightways, Inc.
Truck and Bus—R. R. Burkhalter, Dana Corp.

New Councilors

J. H. Famme, Convair Div., General Dynamics Corp.; N. C. Penfold, Automotive Research Associates; and Leonard Raymond, Socony Mobil Oil Co., Inc.

new FO-6226, six cylinder, overhead valve, gasoline engine. It has a displacement of 226 cu in., and is rated 143 hp at 4400 rpm. This engine is slated for the new Checker Cab. Also displayed by this builder was the VD-8603 transportation engine—a V-8 Diesel of 603 cu in. displacement, rated 200 hp at 2800 rpm.

Dana Corp. had on display for the first time a working model of the Spicer Synchro-Master 12, Model 8125, 12-speed truck transmission. Descriptive details were contained in AI, October 15, page 80.

A new type of "spin-resistant" differential made its first public appearance at the display. Introduced by the Warner Automotive Div., Borg-Warner Corp., it is described in simple terms as being "a conventional differential, plus preloaded cone brakes and side gear thrust that provide internal resistance to overcome unequal traction at the rear wheels." Simplified design, with less parts, is featured.

In the same booth, Warner Gear Div., Borg-Warner Corp., had cutaway models of the new "Velvet Drive" marine transmission. Available in three sizes for use with engines up to 500 cu in. displacement, this forward-neutral-reverse transmission is hydraulically actuated. It is also available with integrated reduction gear boxes.

Vickers, Inc., exhibited a number of power steering components, including the new VT-33 pump designed for direct drive off the engine crankshaft. It is capable of operating through a speed range of 425 to 4600 rpm; and its rated capacity at 1200 rpm is 6.9 gpm. Additional details were given in AI, January 1, page 109.

Two new "Whisper" engines were displayed by the American M. A. N. Corp. Known as DO634M and DO636M, both are four-stroke, watercooled Diesels, having bores of 4 11/64 in. and strokes of 5 3/64 in. One is a four-cylinder and the other a six-cylinder engine. The former has a piston displacement of 277 cu in., and is rated 95 hp at 2700 rpm. The six-cylinder engine has 415 cu in. displacement, and is rated 150 hp at 2700 rpm.

Spray Products Corp. exhibited a working model of the Instnstart spray starting fluid applicator, recently developed to facilitate cold starting of gasoline and Diesel engines under severe operating conditions. The device makes use of a highly volatile fluid contained in a pressurized can. Dash control opens a valve in the top of the can which allows the fluid to flow through tubing to a spray nozzle mounted in the engine's intake manifold.

Perfect Circle Corp. featured the Speedostat automobile speed control which automatically adjusts throttle position to maintain a preset car speed. This instrument was described in AI, September 15, page 96.

The Elastomers Div. of E. I. du Pont de Nemours & Co., Inc., displayed typical applications of urethane foams by means of a cutaway automobile body section. These applications include use of the material in crash pads, sun visors, seat cushions, under floor mats, and on trunk lids, as well as for headlinings. The latter (headlining) application appeared to be rather novel. For this purpose a layer of urethane foam is coated with Hypalon in which is imprinted a decorative pattern; the material is precut to the desired sizes; and the "panels" installed by using snap-in metallized plastic moulding.

Hercules Motors Corp. showed two new aircooled industrial engines. The C2-90D is an overhead valve, two-cylinder, four-stroke type, with a piston displacement of 88 cu in., rated 30 hp at 3000 rpm. The CV4-180 is an overhead valve V-4, with 176 cu in. displacement, and is rated 70 hp at 3000 rpm.

Reynolds Metals Co. featured aluminum transmission housings such as used by Buick and Chevrolet, and also displayed one of Buick's front brake drums made of ribbed aluminum for improved cooling.

The Committee of Stainless Steel Producers, American Iron and Steel Institute, was one of the new exhibitors at SAE. On show were many items in stainless steel, among which were grilles, exterior and interior trim, and aircraft honeycomb sections.

At Associated Spring Corp.'s booth the theme was slanted toward the engineer. Basic spring design principles, spring redesigns for improved performance or lower production cost, and on-the-spot talent for solving spring problems were available in this exhibit.

Kaiser Aluminum & Chemical Sales, Inc., had on display a full-sized, all-aluminum Jeep body of unitized construction. It was designed and built jointly by Kaiser Aluminum and Ford Motor Co. for U. S. Army Ordnance. The body and frame structure, assembled by spot welding, weighs only 124 lb.

TECHNICAL SESSIONS

EUROPEAN MANUFACTURERS have advanced materially and in some phases of manufacture and machine tools are ahead of us. This was reported, during one of the panel sessions, by four production executives who recently visited European automotive plants. As one of the speakers put it, the Europeans are advancing and "we could be out-sputniked." The principal point all of the speakers were trying to get across was that we can get new ideas from overseas companies and can benefit tremendously by such an exchange. P. A. Miller, Ford Motor Co., for instance, said the cost of his trip was repaid 2000-fold.

Mr. Miller visited supplier plants in the main. As an illustration of what some of the firms are producing, he mentioned that an English company is making about 7000 generators, 7000 starters, and 50,000 lamps per day. One of the German companies is making about 5000 generators, 5000 starters, and 35,000 lamps per day. As another illustration that the Europeans are producing at high rates by efficient methods, Harold Johnson, Vauxhall Motors, Ltd., cited that a number of companies are producing better than 1000 vehicles per day, and several companies 1500 vehicles per day.

S. K. Rudorf, A. O. Smith Corp., and E. F. Gibian, Thompson Products, Inc., centered most of their remarks on machine tool equipment. Mr. Rudorf had visited the Hannover tool show, and gave some of his impressions. While designs are similar to those in the past, the machines seem to have been "beefed up" in a lot of cases. They appear to have more originality, although there are some exceptions. The Euro-

peans are outstanding in high precision equipment, measuring equipment, toolroom equipment, etc. They are giving more attention to precise measurements, using optics. Controls are more usable and easier to operate. Mr. Rudorf saw electrospark machining where "large chunks" of metal were being removed.

Mr. Gibian mentioned that while he was there, Simca (France) was installing a new automatic painting setup with data processing. Various parts of a component will run through the line and come out at the end in proper sequence for assembly. It is a British system, using French equipment. He also mentioned seeing a Swiss unit for machining air foil sections from tracings. He said they excel on borers. One make uses an optical system, requiring no jigs, tooling or fixtures—and is ideal for pilot or moderate run production. Another firm, in Stuttgart, has developed a "dip" polishing method. Abrasive and sawdust are contained in a drum which is spun, the centrifugal action throwing the abrasive mix to the outer circumference of the drum. Workpieces are submerged or "dipped" in the mixture while the drum is rotating. Finishes are said to be excellent. Mr. Gibian also expressed the opinion that European forging equipment is outstanding. In the case of one machine the workpiece is held in a rotating shaft tied in with the machine's controls, giving fully automatic processing. He added they have made important advances in cold forging and extrusion presses, as well as in the die casting and plastics extrusion equipment.

It was pointed out by several of these speakers that many of the European plants were built up after the war and that this gave them a tremendous advantage. Company executives and engineers visited the United States, learned what we were doing, and then tried to make improvements. There is an intense effort to produce more at lower cost, automatic equipment is becoming common, and the manufacturers have come up with some ingenious devices. The speakers were of a unanimity of opinion that American manufacturers could profit by an exchange of information.

SEALS

SAVINGS IN TOOL, scrap and manufacturing costs have been made possible by improved elastomeric materials and designs for automatic transmission piston seals, the gathering was told. E. S. Bower and B. C. Vandermar, Acadia Synthetic Products Div., Western Felt Works, traced the development of lip type seals, and indicated they offer durability and

EXHIBITORS IN SAE ENGINEERING DISPLAY

Aeroquip Corp.
Aluminum Company of America
American Bosch Arma Corp.,
American Bosch Div.
American M.A.N. Corp.
American-Radiator & Standard
Sanitary Corp.,
Detroit Controls Div.
Ampex Corp.
Anchor Coupling Co., Inc.
Armco Steel Corp.
Armstrong Cork Co.
Associated Spring Co.

Battelle Memorial Institute
Bendix Aviation Corp.
Beryllium Corp.
Bohn Aluminum & Brass Corp.
Borg-Warner Corp.,
Long Manufacturing Div.
Warner Automotive Parts Div.

Chelsea Products Co.
Cities Service Oil Co.
Cleveland Graphite Bronze Co.
Committee of Stainless Steel Producers, American Iron & Steel Institute
Continental Motors Corp.

Dana Corp.
J. R. Dannemiller Associates
Deluxe Products Corp.
Detroit Aluminum & Brass Corp.
Dow Chemical Co.
Dualoc Drive, Inc.

E. I. du Pont de Nemours & Co., Inc.,
Elastomers Div.
Plastics Div.
Eagle-Picher Co.,
Fabricon Products Div.
Enjay Co., Inc.

Fairchild Engine & Airplane Corp.,
Al-Fin Div.
Fawick Corp.,
Fawick Brake Div.
Flexonics Corp.
Fram Corp.

Garrett Corp.,
AiResearch Industrial Div.
General Dynamics Corp.,
Liquid Carbonics Div.
General Radiator, Inc.

Heli-Coil Corp.
Hercules Motors Corp.
Heyer Industries, Inc.
Higbie Manufacturing Co.,
Avon Tube Div.
Hoof Products Co.
Hoover Ball & Bearing Co.
Huck Manufacturing Co.

International Nickel Co.

Johnson Bronze Co.

Kaiser Aluminum & Chemical Corp.
Kaydon Engineering Corp.
Kelsey-Hayes Co.
Kistler Instruments Corp.

Lake Shore, Inc.
Lapeer Manufacturing Co.
LaSalle Steel Co.
Leece-Neville Co.
Lincoln Engineering Co.
Lipe-Rollway Corp.
Lisle Corp.
Lord Manufacturing Co.

MB Manufacturing Co.
Magnaflux Corp.
Metal Finishing Service
Monroe Auto Equipment Co.

Perfect Circle Corp.
Pierce Governor Co., Inc.

Reynolds Metals Co.
Rosan, Inc.
Ross Gear & Tool Co., Inc.

Satullo Co.
Schwitzer Corp.
Spray Products Corp.
Stratoflex, Inc.
Sun Oil Co.

Thompson Products, Inc.
Torrington Manufacturing Co.

Vickers, Inc.

Waukesha Motor Co.
Jervis B. Webb Co.
Wyman-Gordon Co.

Zollner Corp.

good performance. Assembly is also facilitated, and machining requirements are less severe. Bore finishes can be opened up to 100 microinches or better; bore diameter tolerances may be relaxed to ±0.004 in.; groove diameters may be set at ±0.004 in.; and groove widths may be opened up to ±0.005 in. when the lip seal is used, they said, in citing the results of recent tests.

In the selection of material the prime considerations were flexibility, resistance to the fluids being sealed, resistance to temperature extremes, adequate physical properties, and precision-forming ability. As transmission designs increased the operating temperature, a different base polymer, polyacrylate rubber, was resorted to. Seals of this material have been in use since 1952 in some transmissions and are performing satisfactorily, they said. To provide for even higher operating temperatures, compounds based on fluoro-carbon rubbers are now being evaluated, it was reported.

GASOLINE ENGINE OILS

FIELD TESTS run with automobiles, taxicabs and motor trucks to measure the engine cleanliness characteristics of crankcase lubricants have shown that laboratory Caterpillar Diesel engine tests fail to accurately predict lubricant performance in gasoline engines. This was the conclusion reached by J. K. Patterson and W. E. Waddey, Esso Research and Engineering Co., who presented a paper on the subject of "Limitations of Diesel Engine Tests in Formulating Gasoline Engine Oils." Oils designed primarily for Diesel engine service, they explained, are not necessarily the best lubricants to control deposits in gasoline engines. And the practice of applying Diesel engine test standards to gasoline engine lubricants can result in poorer quality gasoline engine lubricants.

The authors advocated that oils be evaluated on the basis of their particular application. They mentioned the work of the CRC to develop a suitable research technique for predicting gasoline engine field performance, as being a commendable effort in that direction. Also work in the authors' laboratories leading to the development of a cyclic test for predicting the all-around performance of gasoline engine lubricants.

NOISE REDUCTION

L. M. BALL, Chrysler Corp., made a number of interesting observations in discussing the "Principles of Noise Reduction." He placed emphasis on the importance of making the fullest possible use of human faculties in doing sound work. "It is almost always unwise to entirely replace human reactions with electronic instruments," he cautioned, adding, "it is far preferable to use electronics to extend and supplement human faculties."

In discussing sound insulation enclosures, Mr. Ball demonstrated that the effectiveness of sound insulating materials is, in general, directly proportional to their weight. This is contrary to the common assumption that sound enclosures should be made from light, fluffy sound-absorbing materials. He also pointed out that a few leaks or holes, amounting to only an insignificant percentage of the total area of an enclosure, can almost completely nullify its effectiveness as a sound insulator. For instance, a poorly fitted grommet in the dash could "easily rob the dash liner of a dollar's worth of sound insulating value."

Mr. Ball listed five basic means at the disposal of the sound engineer: Reduction of the noise at the source by avoiding mechanisms which produce large impulse forces, and by refinement of mechanical design and manufacture; use of vibration isolating mountings; damping of resonant elements to reduce vibration and radiation of noise, and to quench ringing or rumbling; enclosure of the noise source in a heavier barrier free from openings; and use of materials for sound-absorption. He admitted that "because of physiological factors inherent in our hearing system, and because of the peculiar relationship between *sound intensity* and *loudness perception*, noise reduction in mechanical systems presents real problems to the sound engineer." Likewise, economic factors must be taken into account.

AIR SUSPENSION SYSTEMS

THE SESSION on air suspension systems attracted, by far, the greatest amount of interest on the part of those attending the annual meeting. Though scheduled for 2:30 pm on January 14, the Grand Ballroom of the Statler Hotel was filled to capacity by 2:00 pm. Air suspension as being offered on the 1958 Buicks, Ramblers, Fords, Chevrolets, and Oldsmobiles were described by five speakers on this program. Some of the details of these presentations will be given in the February 15 issue of AUTOMOTIVE INDUSTRIES.

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Pilot Production of Natsyn Checks Rubber Shortage Threat

Production of Natsyn at a new $750,000 plant is described by Goodyear Tire & Rubber Company as a major step toward meeting a threatened world-wide shortage of natural rubber by 1960.

Goodyear's new plant is producing Natsyn on a tonnage basis and the company expects soon to begin engineering a full-scale plant with an annual capacity of 25,000 to 30,000 tons.

Natsyn is a synthetic rubber said to have the molecular structure and performance characteristics of natural rubber. It is made with the same basic molecule of isoprene that is found in the rubber tree. Natsyn, however, can be polymerized in a matter of hours, while it takes a rubber tree seven years to produce.

Full-scale production of Natsyn, however, depends upon the availability of isoprene, a petroleum derivative currently in short supply.

In its pilot plant, Goodyear first purifies isoprene and solvents, then charges proper proportions into reactors with a catalyst. After polymerization, the Natsyn is in the form of a thick viscous material as it is drawn from the reactor.

Unreacted isoprene and solvents then are removed by drying and from this point the crumb-like Natsyn is handled and processed in the same manner as tree-grown rubber.

Almost completely automated assembly line where approximately 500 shock absorber shafts per hour are hardened with a General Electric 40-kw induction heater (in background). Shown in the foreground are two screw machines where the parts are formed.

Shock Absorber Shafts Hardened in Automatic Equipment

APPROXIMATELY 500 shock absorber shafts per hour are being hardened with each of three General Electric 40-kw induction heaters at the Monroe Auto Equipment Co. plant at Hartwell, Ga.

The hardening process is performed on an almost completely automated assembly line. The induction heating equipment was supplied by General Electric's Industrial Heating Department at Shelbyville, Ind.

The new equipment requires far less floor space than equipment required for hardening by the former chrome plating process, according to the Monroe Auto Equipment Co.

To conserve floor space with the induction heater, the heater, heat exchanger, and voltage regulator are installed on a platform over the assembly line. A transmission line runs from this balcony to the line below connecting to an output transformer on the floor.

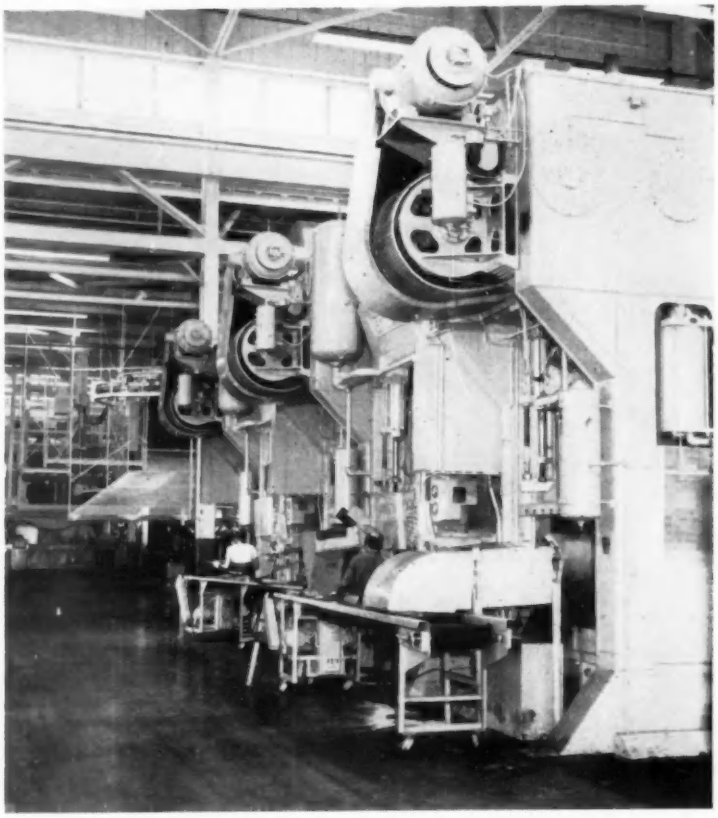
The Monroe Auto Equipment Co. supplies Load Leveler shock absorbers to leading automobile manufacturers and is a major supplier of these parts to the replacement parts market.

In manufacturing the equipment, parts are formed on a screw machine, then pass through a centerless grinder, induction heater fixture, water quench, two additional centerless grinders and finally through a lapping machine. Length of the shafts is 13 in. The line requires only one operator to feed stock into the screw machine at one end and an operator to check the finished parts as they emerge from the lapping machine.

• • •

Ford Lakes Fleet Ends Season With Second Highest Tonnage

Ford Motor Company's Great Lakes freighter fleet ended the 1957 season with the second highest tonnage haul in the fleet's 33-year history. The three boats—Henry Ford II, Benson Ford and William Clay Ford—carried 2,913,682 tons of iron ore, limestone and coal into the Ford Rouge Plant in Dearborn.



One of the rows of Verson 300-ton presses for producing air cleaner covers. Note the portable power-driven conveyor sections connecting the presses.

New Equipment Installed at AC Spark Plug Plant

AC SPARK PLUG DIVISION, GMC, now has in operation an entirely new plant on its property in Flint, devoted exclusively to the manufacture of its line of air cleaners and breathers. The facilities described here are equipped for making many of these items; additional equipment and assembly lines will be installed shortly. Before the end of 1958, this 258,480 sq ft building will be making all of these products for all customers.

The floor plan reproduced here indicates some of the major equipment now in operation as well as the Jervis B. Webb power-and-free conveyor system. The conveyor system too will be extended as additional press lines and assembly stations are installed.

At the present writing there are three rows of heavy duty 300-ton Verson presses for producing covers and element support plates; and four 900-ton Verson transfer presses for making the large shrouds. As illustrated, the 300-ton presses in each row are linked by power-driven portable belt conveyors to facilitate handling.

It may be noted at this point that AC switched this year to the use of cold rolled steel strip for air cleaners, replacing the tin-plated stock used heretofore. Tin plate, however, still is employed in the making of the small breather assemblies. In view of this change in materials the finished CRS stampings all are given a phosphate treatment to provide corrosion resistance.

Examining the floor plan, you will find the 125-ft B & S Fabricators washer and phosphate coating unit directly below the press lines. Three elevator drops in the aisle lower the conveyor hangers to floor level for loading the stampings from the press lines. These are a part of the Jervis B. Webb conveyor system, designed to transport the parts through the washer, then to storage and the assembly lines. Three additional hanger drops are arranged to feed the current assembly stations.

As the illustrations indicate, the hangers used in this plant are really outsized mainly because of the large size of individual air cleaner elements. They are 8 ft on each side, hold 112 shrouds and from 112 to 120 covers, depending upon size. At the present time the power-and-free system accommodates 33 hangers per hour. In addition, the conveyor system circulates hangers overhead to provide storage space without using valuable floor area.

A smaller, Ransohoff washer and phosphating unit is installed near the big unit for handling small parts. This one is served by an independent conveyor line for transport to assembly stations.

What is not obvious in the illustration is that all presses and other equipment are painted in a handsome scheme of pastel colors. Not only does this contribute to good

DIAGRAMMATIC LAYOUT OF THE PLANT

in its present state of completion

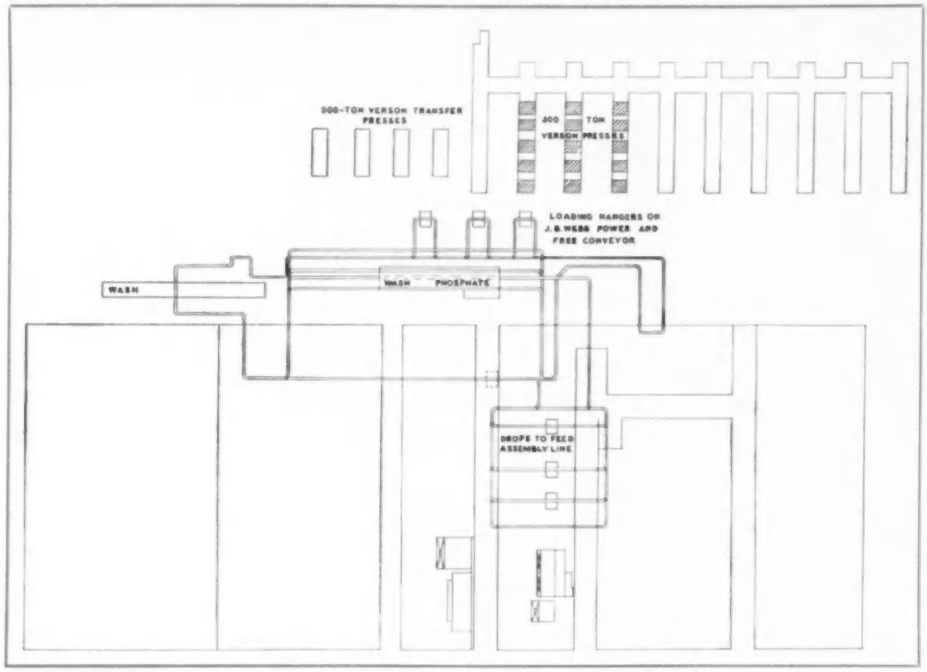
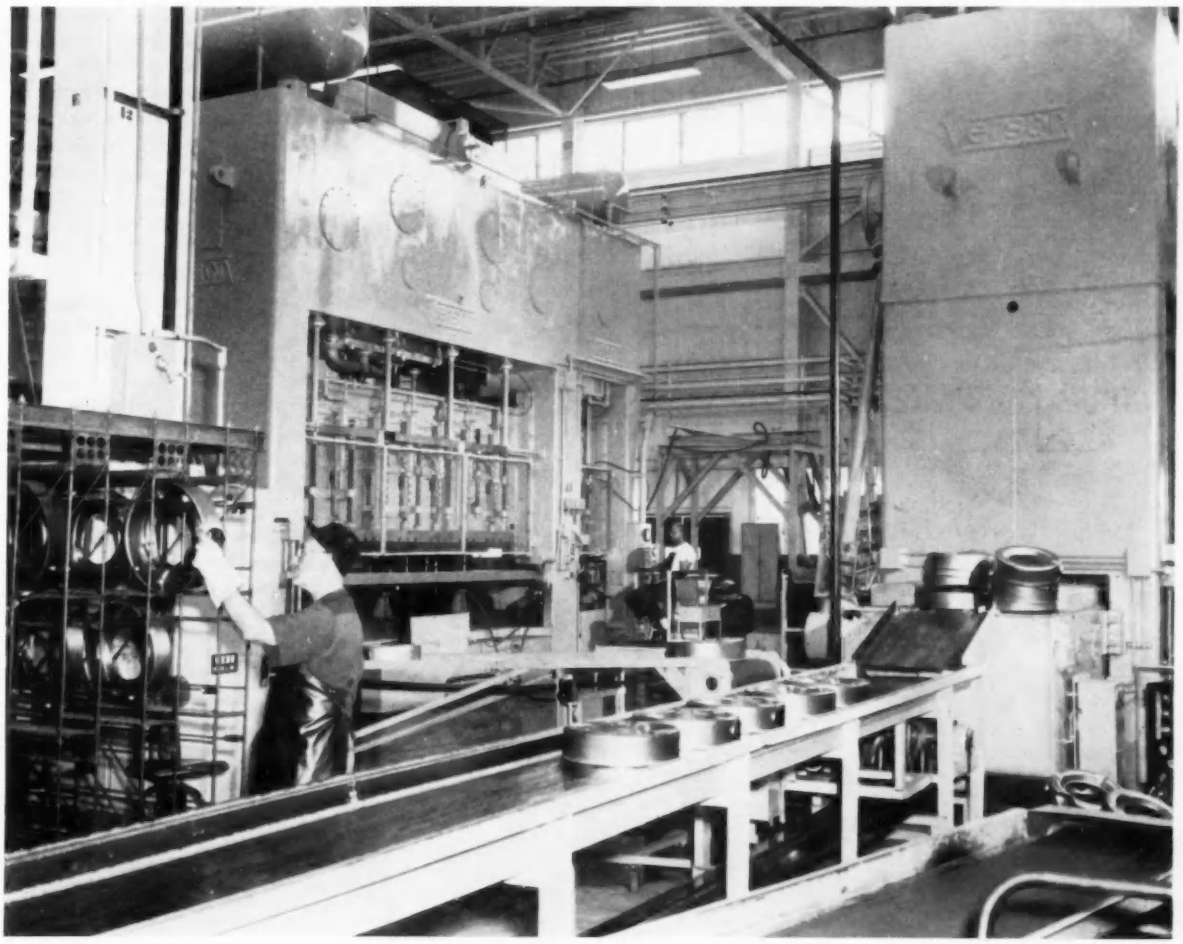
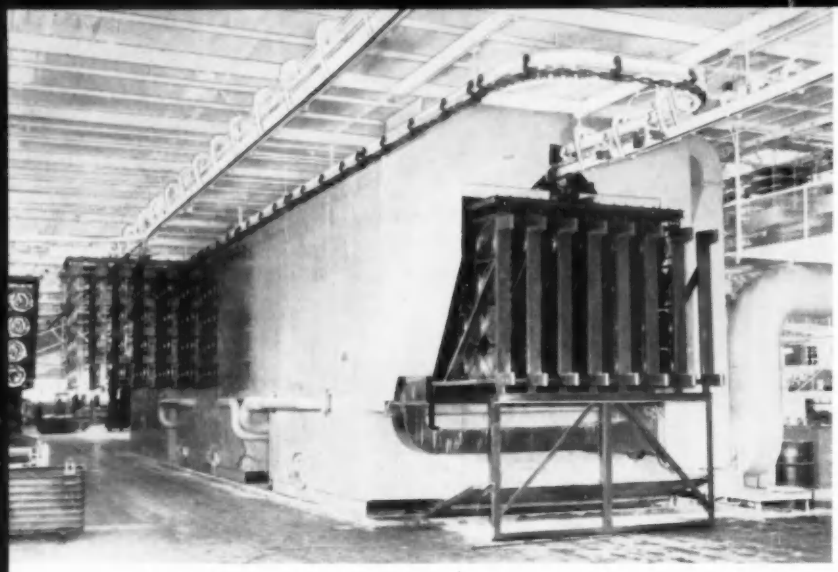

900-TON VERSON TRANSFER PRESSES
300 TON VERSON PRESSES
LOADING HANGERS ON J.B. WEBB POWER AND FREE CONVEYOR
WASH
WASH PHOSPHATE
DROPS TO FEED ASSEMBLY LINE

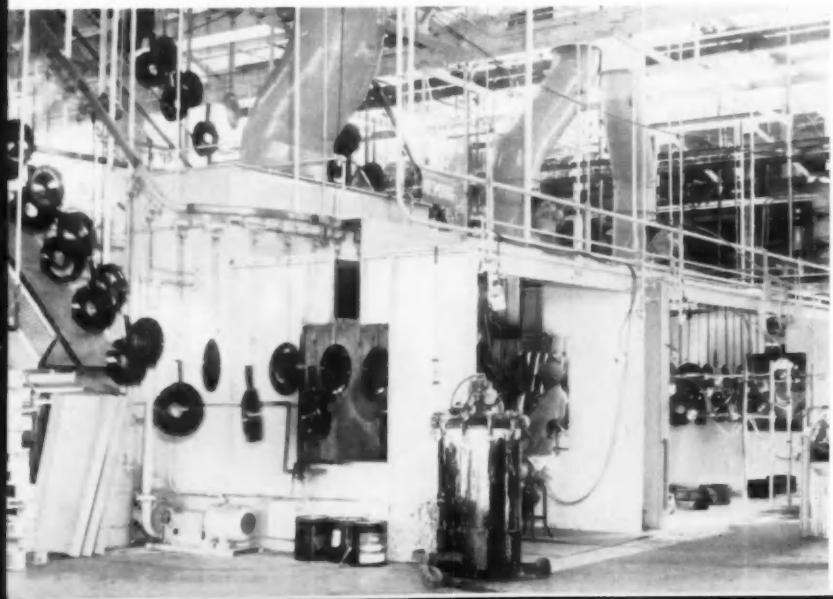
Illustration below shows close-up of one of the 900-ton Verson transfer presses for producing the larger air cleaner body sections. Finished stampings are ejected onto the conveyor in the foreground and are loaded into the large conveyor hanger seen at the extreme right.





The 125-ft B & S Fabricators unit for washing and phosphate coating of air cleaner parts. Conveyor hangers enter the unit via the power-and-free conveyor. The entrance end in the foreground shows the fixed separators through which the hangers enter the unit. Function of the separators is to assure that each row of parts on the hanger is completely separated from its neighbors while going through the phosphating cycle.

Here is one section of the air cleaner assembly line. In the background is one of the hangers, lowered to floor level, feeding parts to the operators. Note the portable power-driven conveyor connecting the assembly stations.



housekeeping, it also makes for pleasing working conditions.

Returning to the press lines, it is of interest that coil stock is fed to the presses from the familiar Littell reels. Transfer presses are tooled flexibly in keeping with the size of the parts. The illustrations seen here were taken at a time when the presses were equipped with 8-station tooling. Depending upon circumstances the same presses may have more or less stations at any given time.

All of the press line are provided with a system of under-floor scrap conveyors feeding into a main scrap conveyor in the basement gallery. At present the scrap is loaded loosely into gondola cars outside the building. Later on when more presses have been installed, AC contemplates the installation of a Logeman baler and will ship scrap in bales.

Some of the illustrations show portions of the air cleaner assembly line. As mentioned earlier, assembly stations are fed by hanger drops. It may be noted that the power-and-free system is so arranged as to have a hold station just ahead of each drop to maintain the flow of parts uninterruptedly.

Because of the variety of air cleaners that may have to be handled over the same assembly lines, AC has developed great versatility and flexibility of equipment. Thus most of the welders are of portable type, making it possible to move them anywhere along the line as conditions dictate. The same is true of the portable power-driven belt conveyor sections. Besides this, the spot welders are of unique design to permit changeover to different patterns of spots as desired. This applies particularly to the special A-frame multi-spot welder near the end of the assembly line. The

Painting of air cleaner sections is handled here. At the extreme right is the GM electrostatic spray booth. The operator is stationed in a repair booth. Painted parts proceed on the monorail and are transported upward at the left to the drying oven located atop the roof.

Link single-spot welder used on this line is unique in being of double-stroke type. It can be quickly adjusted to provide a deep throat for clearance in one movement; and it will also operate on a short stroke for stitching.

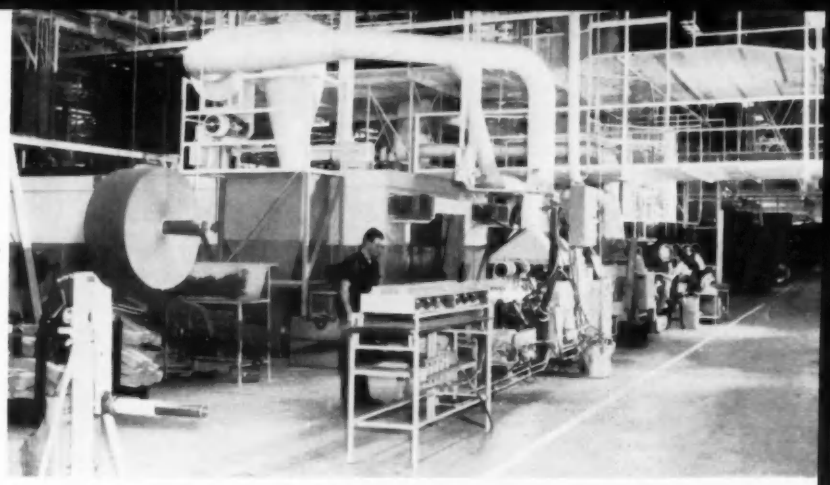
As air cleaner assemblies are completed they move on the overhead conveyor into the special GMC electrostatic spray booth where the work is painted automatically. The automatic spray guns are of cone-shape and the paint is so finely dispersed in the electrostatic field that there is practically no visible overspray in the booth or on the floor. The work hangers rotate while moving so as to present all sides of the part to the spray.

Upon leaving the spray booth the conveyor turns sharply upward and transports the painted parts to a drying oven on the roof.

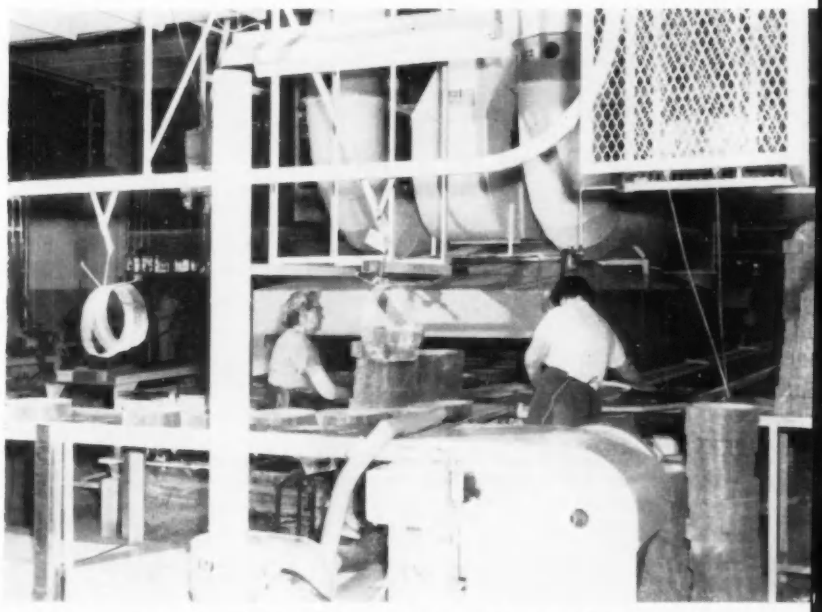
As is well known, most air cleaners for 1958 cars have disposable paper elements. Illustrated here are some views of the special automatic line developed by AC for producing the paper element. AC employs a special plastic-impregnated paper which is received in large rolls. These rolls are slitted into narrower strips, then fed into the process equipment. The first stage is heating of the strip to soften it, then through the folder for producing the accordion pattern. Following this, the strip enters a curing oven and is sawed into narrow strips as it leaves. This takes the strip to the assembly conveyor for succeeding manual operations.

At this point the operators assemble inner and outer screens to encase the paper element. At the end of this conveyor, the operator places the element in a sheet metal mold. This mold, prepared at a sta-

(*Turn to page* 109, *please*)



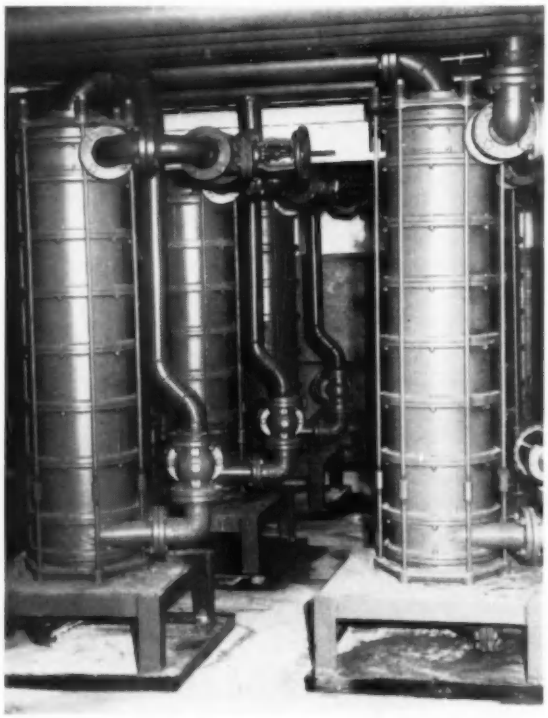
Perspective view of the compact line for producing special paper elements. The process begins with the feeding of paper from the roll at the left. In the background may be seen the element assembly line.



End of the paper element assembly line. Here the paper element has been encased in the wire screen—both outside and inside. The operator at the right may be seen in the act of removing the prepared sheet metal mold into which the element is set. Then the part moves into the oven in the background.

Close-up of the compact assembly machine and conveyor for semi-automatic assembly of breathers. Components parts are readily at hand on both sides of the machine.

Special Machine Anodizes Chevrolet Grille and Headlamp Bezel

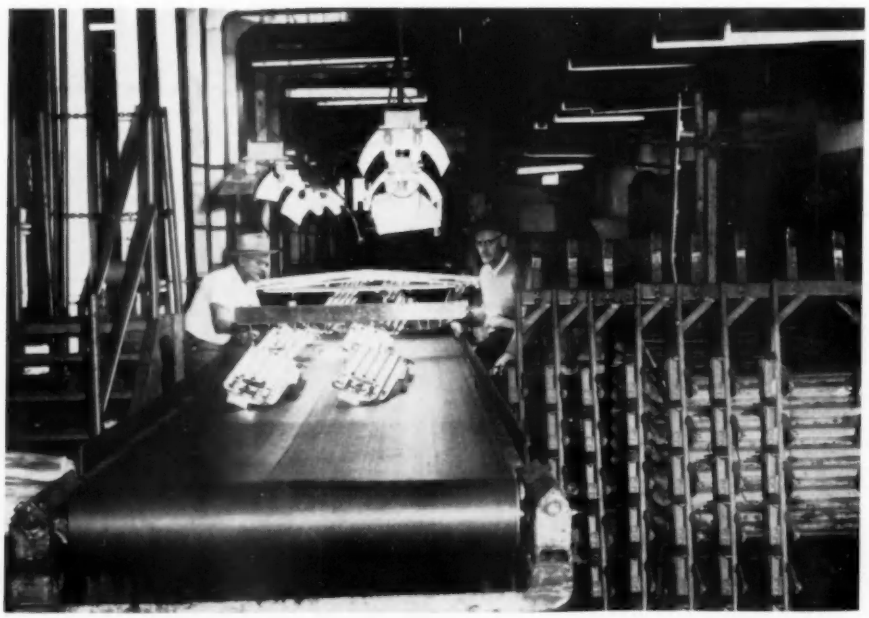


Some of the special heat exchangers installed in the basement gallery.

WHAT is considered to be the largest anodizing machine for decorative parts to be found in the motor car industry is the 165-ft Hanson-Van Winkle-Munning unit installed in the Chevrolet Press Plant in Flint. For 1958 production this machine is anodizing the Chevrolet aluminum grille and dual headlamp bezel.

Built to Chevrolet specifications, the unit is endowed with exceptional flexibility. Current production requires grilles and bezels in bright finish but without color. However, since color finishes may be desired sometime in the future—for another model year—the machine contains two additional tanks for color, together with the necessary rinses for each one.

The machine has been provided with a suitable programming control that will make it possible to route automatically certain racks to one or the other of the color tanks if and when color is specified. Moreover, unless the color is gold—in which event the



The automatic inspection conveyor for checking the quality of the anodized coating. The pairs of brushes that contact the work may be seen on the lower edge of the bar in the foreground.

rack must go through both tanks—it is readily possible to have two different colors on similar or different parts simply by actuating the proper controls. Programming of the machine to effect such special cycles is done simply by adjusting one or more of a cluster of contractors mounted on each of the carriers.

As illustrated, the parts are assembled in special racks, accommodating 12 grilles per carrier, and 84 bezels per carrier. It may be of interest to note that the racks are fabricated of aluminum and covered with a polyvinyl coating for insulation against the chemicals used in the various baths. The racks then are fitted with titanium contacts to provide the path for current flow through each part.

Generally speaking, the installation represents a complex of cycle functions and accessory equipment of various kinds to provide the variety of services required for its operation. As noted in the following outline, provision is made for air agitation in various tanks, as well as a combination of air and mechanical agitation in the bright dip tank. Moreover, some of the tanks require heating to a certain temperature level while the anodizing tank (No. 16) must be cooled to a temperature of 68 to 72 F. Where heating is required, provision is made for plate coils in the tank with steam for heating. Cooling of the anodizing tank, on the other hand, is occomplished by an installation of "Polybloc" vertical type heat exchangers which are said to be exceptionally efficient and effective.

Still another special feature is found in connection with the Hot Seal tank (No. 30). Here it is necessary to provide a supply of deionized water.

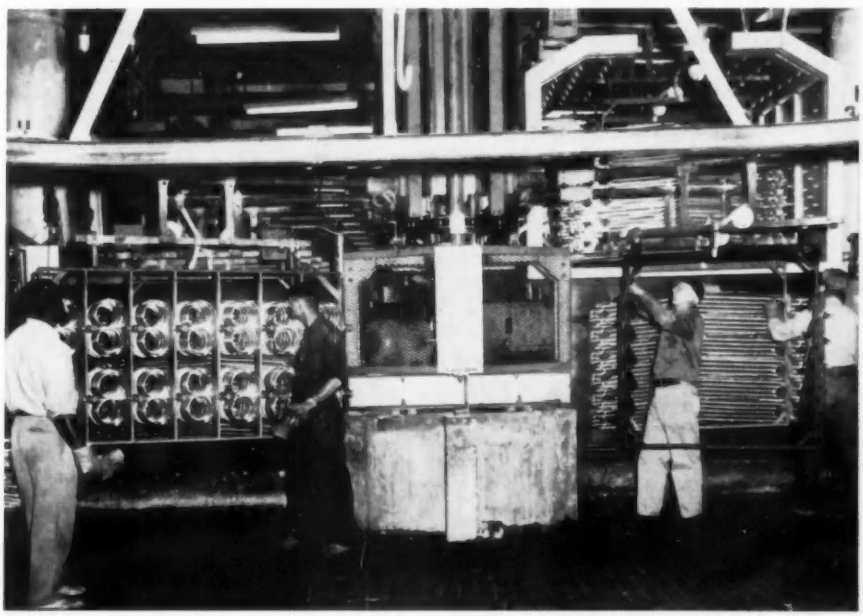
All of the special accessory equipment required for these various services is housed in the basement gallery immediately below the anodizing machine.

The sequence of steps in the anodizing cycle is summarized in the accompanying table.

(*Turn to page* 115, *please*)

STEPS IN THE ANODIZING CYCLE

Station No.	Treatment	No. of Carriers	Tank Material
1	Soak Clean (Seco at 160 F)	Five, with selective lift, one early	Type 304 Stainless Steel
2	Spray Rinse	Two—pick up	Type 304 Stainless Steel
3	Cold Rinse	One	Carbon Steel
4	Soak Clean	Two	Type 304 Stainless Steel
5	Cold Rinse	One	Carbon Steel
6	Deoxidize	Two	Carbon Steel
7 & 8	Cold Rinse	One each	Carbon Steel
9	Hot Blow-off	Two	
10	Bright Dip, acid solution	Five, selective	Type 347 Stainless Steel
11	Warm Rinse	Two	Type 304 Stainless Steel
12	Cold Rinse	One	Carbon Steel
13	Deoxidize	One	Steel, PVC-lined
14 & 15	Cold Rinse	One each	Carbon Steel
16	Anodize (15% Sulfuric Acid)	28-selective, 9, 18 or 28	Steel, PVC-lined
17 & 18	Cold Rinse	One each	Carbon Steel
19	Neutralize	One	Carbon Steel
20	Cold Rinse	One	Carbon Steel
21	Dye	Five, selective five or three or skip	Type 304 Stainless Steel
22 & 23	Cold Rinse	One each	Carbon Steel
24	Dye	Four or skip	Type 304 Stainless Steel
25 & 26	Cold Rinse	One each	Carbon Steel
27	Nickel Acetate	Five or skip	Type 304 Stainless Steel
28 & 29	Cold Rinse	One each	Carbon Steel
30	Hot Seal (Deionized water)	11, selective five or 11	Type 304 Stainless Steel
31	Hot Rinse		Type 304 Stainless Steel
32	Hot Blow-Off	Five	



View of the loading end of the big anodizing machine at Chevrolet Flint. Seen here are the special racks with headlamp bezels at the left; grilles at the right.

Semi-Automatic Machine for Oldsmobile Engine Assembly

By Joseph Geschelin

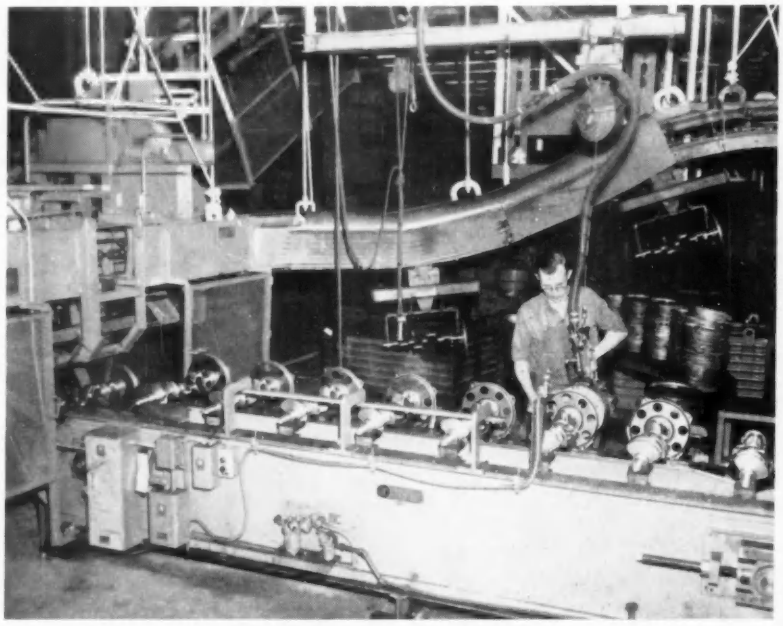
ONE of the most noteworthy developments at Oldsmobile is the semi-automatic assembly machine for preparing basic engine sub-assemblies. Although automatic and semi-automatic assembly machines are making headway for certain types of parts, an engine assembly is so complex that only carefully selected steps can be handled effectively and economically by automatic means.

Its design takes into consideration not only the practicality of an operation but also its cost economy. Certainly there is no gain in eliminating a manual operation if that results in a more costly way of doing the job. Moreover, the planning of some stages must take into account changes in product design that may occur during the useful life of the equipment. It would not be an economy to introduce an expensive station if one knows in advance that the operation will be changed or eliminated later on.

The engine assembly machine to be described is designed to handle all of the operations up to the point of installation of cylinder heads, oil pan, and accessories, i. e., up to the point of "buttoning-up" the assembly. As the sub-assembly is completed, it is delivered to the engine final assembly line for completion. From the standpoint of management, this new assembly machine has a fourfold function:

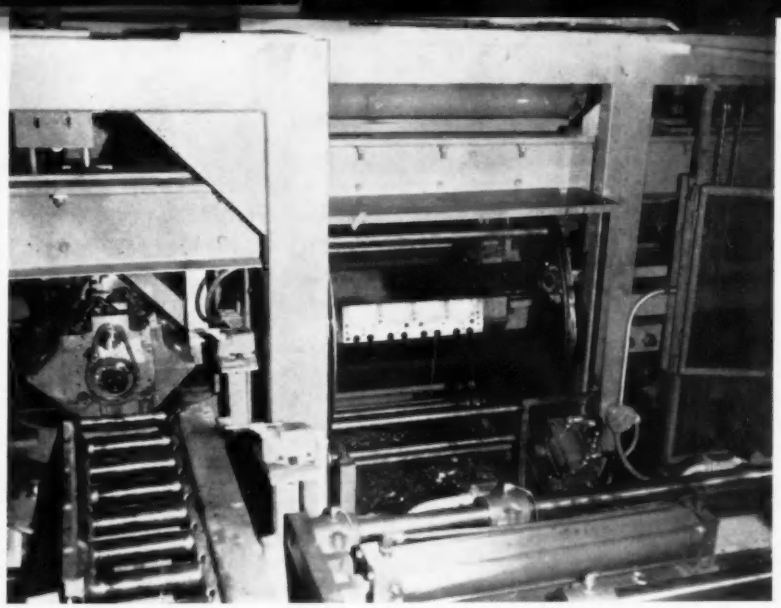
1. Increases productive capacity to 150 engines/hour.
2. Improves quality through better selection and more precise assembly of critical components.
3. Simplifies difficult manual operations through mechanical and hydraulic aids.
4. Reduces cost of completed engines.

The assembly machine combines manual, automatic, and semi-automatic operations, depending upon the nature of the individual step. Some of the machine operations not only improve working conditions and productivity, as compared with manual work, but mark an improvement in quality control as well.

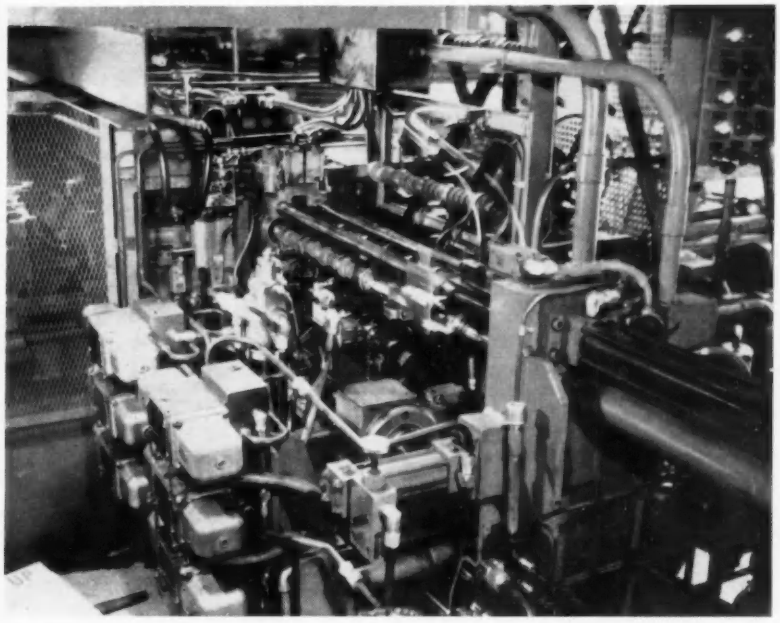


A portion of the short assembly line at which flex plates are attached to crankshafts. Work moves from right to left where the assembly is picked up by the Jervis B. Webb conveyor for transport to the assembly line.

For instance, the line has the first example of automatic installation of camshafts. When the job is done by hand there is always the risk of slight misalignment in sliding the shaft through the camshaft bearing line. The extreme diameter of the cam lobe is only about 0.0015 in. less than the bearing diameter. If misalignment occurs the cam lobe scores the bearing. With the automatic method, a power-operated pilot bar comes in from one end to line up with the front end of the camshaft while



Automatic roll-over station on the Planet Corp. conveyor system. The object of this station is to rid the assembly of foreign material that may have accumulated during assembly stages.



The camshaft installation station along the Webb assembly conveyor. Camshafts are fed downward to the station (in the center) then are pushed into the block by the power cylinder below.

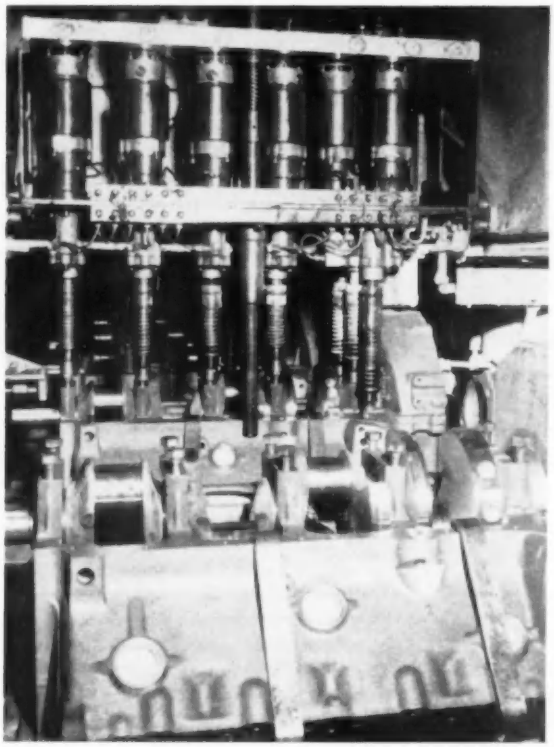
the other end is held on its center. When the power cylinder begins to push the camshaft through, it is accurately centered and will move through the bearing line without interference. The net result is a camshaft that turns in its bearing without friction. This is an excellent example of objectives.

Another operation, this one semi-automatic, also illustrates the same principle. This is the installation of piston and connecting rod assemblies. The assembly is threaded into position manually, at one of the stations, to assure proper alignment with the crankpin. However, the operator does not complete the pressing-in of the piston dome and ring end. This is done by means of hydraulic cylinders with controlled pressure. If there is any off-standard condition such as over-size, or abnormal friction due to a broken piston ring, the hydraulic plunger will not continue past the point of maximum pressure. If the piston does not fit readily, the machine station will stop. Not only does this prevent rejection later on, it also preserves the engine from premature damage.

As the illustrations indicate, the assembly machine is a complex of machine stations, served by a variety of types of conveyors, including the Jervis B. Webb power-and-free conveyor for the crankshaft assembly. The base of the machine, on which the stations are mounted, and on which the engine assembly travels is essentially a transfer machine built by Natco. Individual blocks progress from one end to the other in a timed sequence controlled by the transfer mechanism.

Just ahead of the assembly machine is a small area containing a short line for attaching flex plates to the crankshaft, the flex plate fastenings being secured by means of a five-spindle nut runner. At the end of the Kirkhof conveyor the assembly is mechanically loaded onto the Webb power-and-free conveyor and transported to the adjacent department to feed a group of GMR balancing machines. At each balancer the assemblies are switched off the power conveyor and rest on a free line over each machine. Upon completion of balancing, the operator pushes the conveyor hanger over to engage the power line on the opposite side.

Meanwhile, machined cylinder blocks with main bearing caps attached are transported to the assembly line on another J. B. Webb conveyor system and are released onto the upper tier roller Flyte conveyor storage unit. An operator at this point receives blocks one by one and keys them on the Teletypewriter, indicating for each block the size code for each of the eight bores. This Teletypewriter station schedules operations on the line,



One of the Ingersoll-Rand multiple-nut-runner stations along the assembly line. This one handles the main bearing cap line fastenings.

signaling the piston and connecting rod assembly station where pistons of the proper sizes for each block are assembled and transported by power and free conveyor to the engine assembly line.

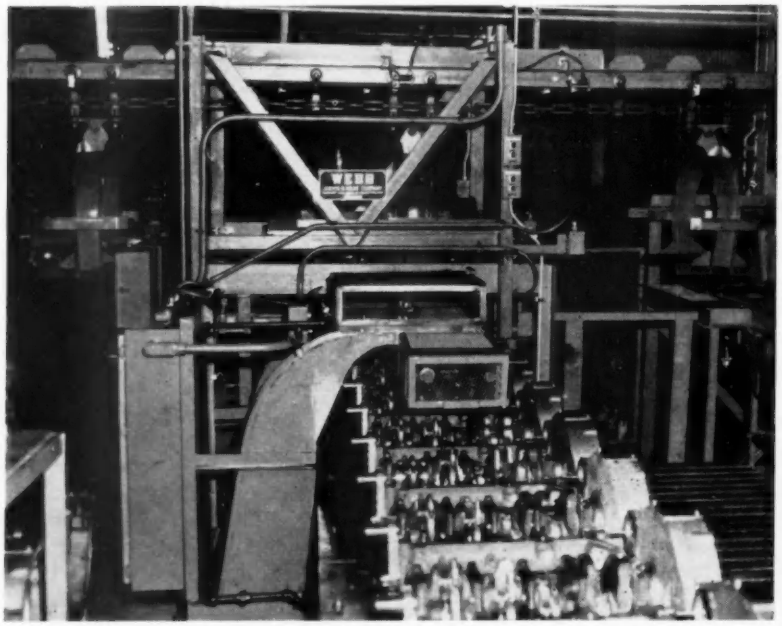
After the operator has signaled the bore size code, the block is automatically transferred to the lower tier of the roller Flyte conveyor system and is ready for transfer to the Natco assembly machine.

First station on the assembly line is an Ingersoll-Rand 14-spindle "nut cracker" which backs out 14 fastenings, leaving the bearing caps loose. At the next station a Natco unit automatically removes the five bearing caps, and lower housing. These parts are then mechanically loaded on a monorail conveyor which delivers them to the re-assembly point after crankshaft installation.

Next is the unique arrangement for automatically installing camshafts. This station, supplied by A. E. Parker, automatically unloads camshafts from an overhead carrier and indexes each camshaft into assembly position. As mentioned earlier, a pilot bar comes in from the opposite side of the line to engage the end of the camshaft; then the pusher cylinder comes in to engage the other end on center before applying pressure to push the shaft in place.

The crankshaft assembly—which comes to the line on the Webb monorail conveyor — then is installed in place; the bearing shells are inserted by hand; and the bearing caps are assembled. It is interesting to note that the correct fit is assured by a selection machine. The operator checks the color code on the block and on the crankshaft, then presses two corresponding colored buttons, and a door opens presenting the correct size bearing shell.

The transfer mechanism now moves the blocks—one by one—into an Ingersoll-Rand 12-spindle nut running machine where the 12 bearing cap fastenings are made up automatically. Important feature here is that all nut runner spindles are torque controlled and are self-checking for torque. If all fastenings are correctly tightened, the unit has an automatically-operated spray gun which squirts white paint near the fastening to indicate acceptance. (*Turn to p.* 109, *please*)



Nearing the end of the assembly line: the sub-assemblies are moving to the background where they are automatically picked up on the special horseshoe type carrier which may be seen travelling on the transverse conveyor.

Fully Automatic 1000 HP Dynamometer Tests Power Transmission Equipment

THE Twin Disc Clutch Co. has a fully automatic 1000-hp dynamometer in its research and development laboratories at Rockford, Ill., with SR-4 instrumentation that eliminates much of the tedium associated with conventional dynamometer testing. At the same time, duration of tests is shortened and accuracy is increased.

The SR-4 instrumentation permits the machine to record automatically an entire family of performance curves in the time a single curve could be plotted using a conventional point-by-point dynamometer.

Input torque is measured by an SR-4 torquemeter and output torque by an SR-4 10,000-lb capacity load cell. Both torque-sensing instruments feed data to special B-L-H xy-function plotters or, alternatively, to dial-reading B-L-H torque indicators.

The function plotters automatically draw performance curves of test units installed on the dynamometer test plate as the machine is operated through a series of rapid changes in input speed and horsepower. The dial reading indicators show the operator at a glance the conditions at any given moment.

The dynamometer was designed and built by Twin Disc to test and measure the performance of the heavy-duty single and multi-stage torque converters, the power take-offs, and the fluid and friction clutches the firm makes for use throughout industry on such equipment as power shovels, drag lines, oil drilling rigs, crawler tractors, off-the-road vehicles, etc.

The dynamometer—which occupies a room 30 ft wide and 70 ft long—consists of six basic units: a 1000-hp Allis-Chalmers 1775 rpm squirrel-cage type motor; a Dynamatic eddy-current clutch brake unit; a pair of Worthington gear boxes; a B-L-H SR-4 torquemeter; a test unit cradle with a 14-foot base plate; and a Dynamatic eddy-current absorption dynamometer.

The machine will deliver 1000 hp to a test unit at all speeds from 900 to 3000 rpm and will develop 8000 lb-ft of torque from zero to 900 rpm. It will

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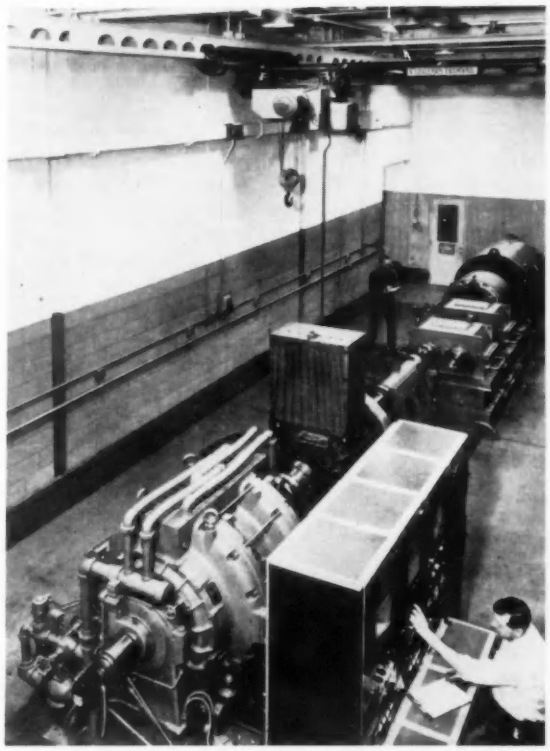
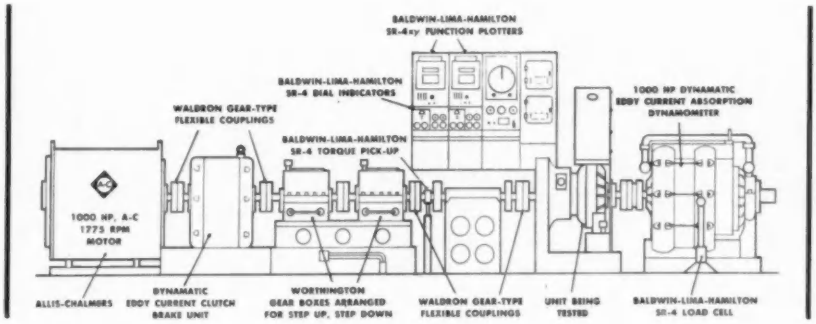


Perspective of the dynamometer bay in the research laboratory. Primary supply transformers are located in a room to the rear of the driving motor.


BALDWIN-LIMA-HAMILTON SR-4xy FUNCTION PLOTTERS
BALDWIN-LIMA-HAMILTON SR-4 DIAL INDICATORS
1000 HP DYNAMATIC EDDY CURRENT ABSORPTION DYNAMOMETER
WALDRON GEAR-TYPE FLEXIBLE COUPLINGS
BALDWIN-LIMA-HAMILTON SR-4 TORQUE PICK-UP
1000 HP, A-C 1775 RPM MOTOR
ALLIS-CHALMERS
DYNAMATIC EDDY CURRENT CLUTCH BRAKE UNIT
WORTHINGTON GEAR BOXES ARRANGED FOR STEP UP, STEP DOWN
WALDRON GEAR-TYPE FLEXIBLE COUPLINGS
UNIT BEING TESTED
BALDWIN-LIMA-HAMILTON SR-4 LOAD CELL

This schematic diagram shows principal operating components of the 1000 hp dynamometer

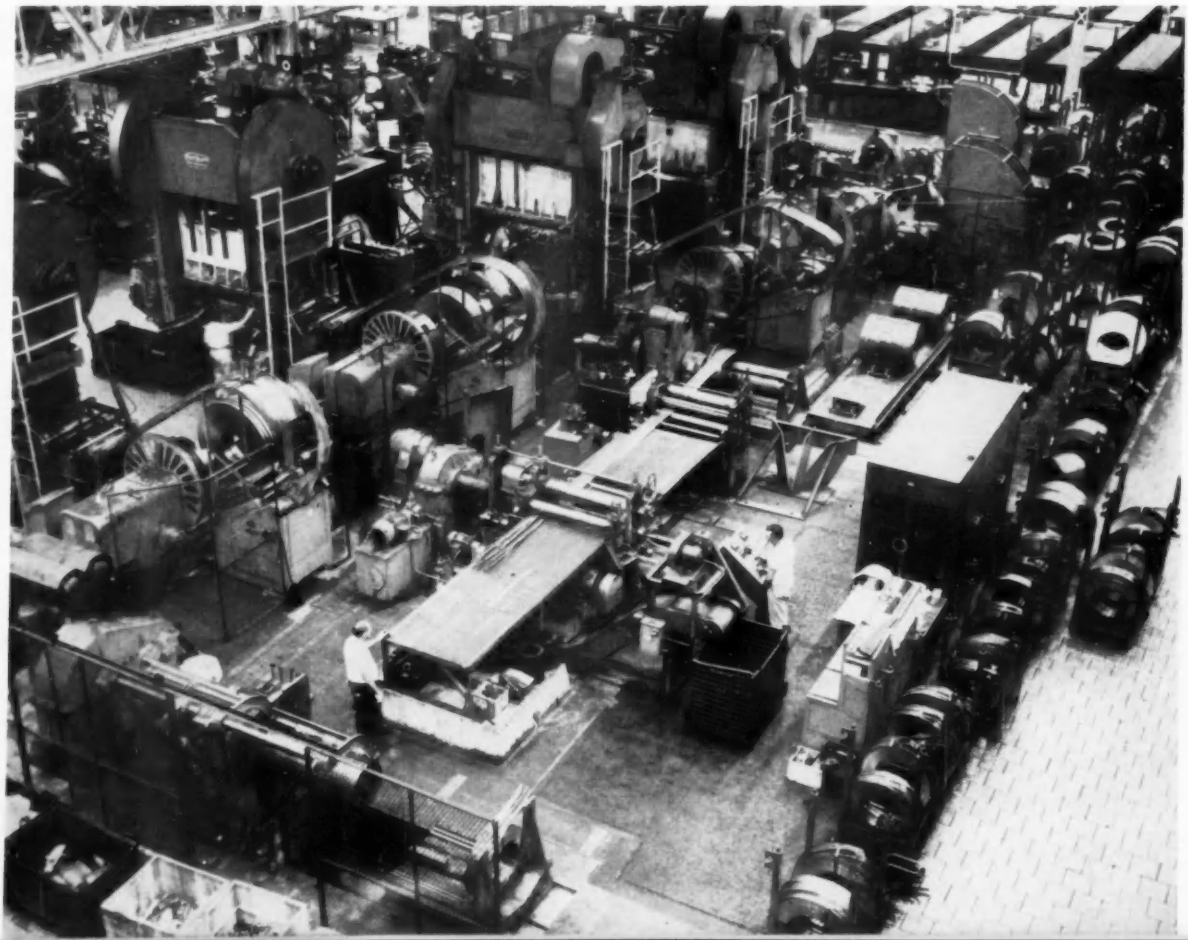
Hundreds of Different Parts Made at Ford Sandusky Plant

MORE than 700 end items are manufactured for the various Ford Motor Co. divisions by the Ford Sandusky Plant, a component of the company's Hardware Division. Located on the outskirts of Sandusky, Ohio, the plant has some 619,000 sq ft of productive floor space, located on a 196-acre tract which includes a 60-acre water-filled quarry. The latter is the major source of industrial water for this plant. With around 2200 employes, it has an annual payroll of around $12-million.

The plant has been provided with facilities for producing a variety of "hardware" parts, including such major assemblies as: automotive lamps; four different sizes of air cleaners; window regulators; door and deck locks; seat slides; etc. In addition, it makes a large assortment of interior and exterior moldings and garnish items.

This variety of components and assemblies involves the use of aluminum and zinc die castings as well as numerous stampings and rolled sections produced from carbon steel and stainless steel strip. Consequently, the floor layout has been sub-divided into suitable areas. One section is equipped exclusively for making zinc die castings; another for aluminum die castings. A large area is devoted to the making of stampings and rolled sections. In other sections are housed facilities for painting and baking; electroplating and buffing; light machining; and a variety

Long perspective in press shop, showing the installation of Yoder equipment for slitting and recoiling coil stock. In the background to the left may be seen some of the large presses—Verson and Cleveland—mentioned in the text.



By
Joseph Geschelin

of assembly stations.

It may be of interest to note that Sandusky consumes some 130 tons of steel per day, including about 8 tons of stainless steel. At least 50 per cent of all coil strip stock is put through a large Yoder slitter for producing narrow strip for individual parts.

Let us consider first the zinc die casting department. Equipped with a large battery of Ajax holding furnaces and Reed-Prentice and Lester-Phoenix die casting machines, as well as several 750-ton Kux units, it consumes some 700 tons of high purity zinc per month. At the head of the department is a group of melting furnaces to provide molten metal for the machines. Metal is picked up by a special ladle on a monorail conveyor and is arranged to be fed into each machine as needed.

Quality control is paramount here, as in every other corner of the operation. In line with this the management is experimenting with techniques leading to an improvement in the quality of thin-walled zinc die castings. To this end, one of the Reed-Prentice machines has been equipped for vacuum casting on a long range experimental project. It is hoped this will result in increased density as well as freedom from porosity.

The aluminum die casting department, too, has its own melting facilities with a special arrangement for remelting all trim and scrap. This department consumes some 350 tons of aluminum per month.

Here we find much larger die casting machines, including a number of 800-ton Lake Erie units. A unique feature in this department is that each die casting machine is served by a small Bliss press for trimming directly out of the die. Trim scrap drops out of the press bed directly into a chute through the floor, leading to a basement gallery. A large metal hopper then collects the scrap at each opening.

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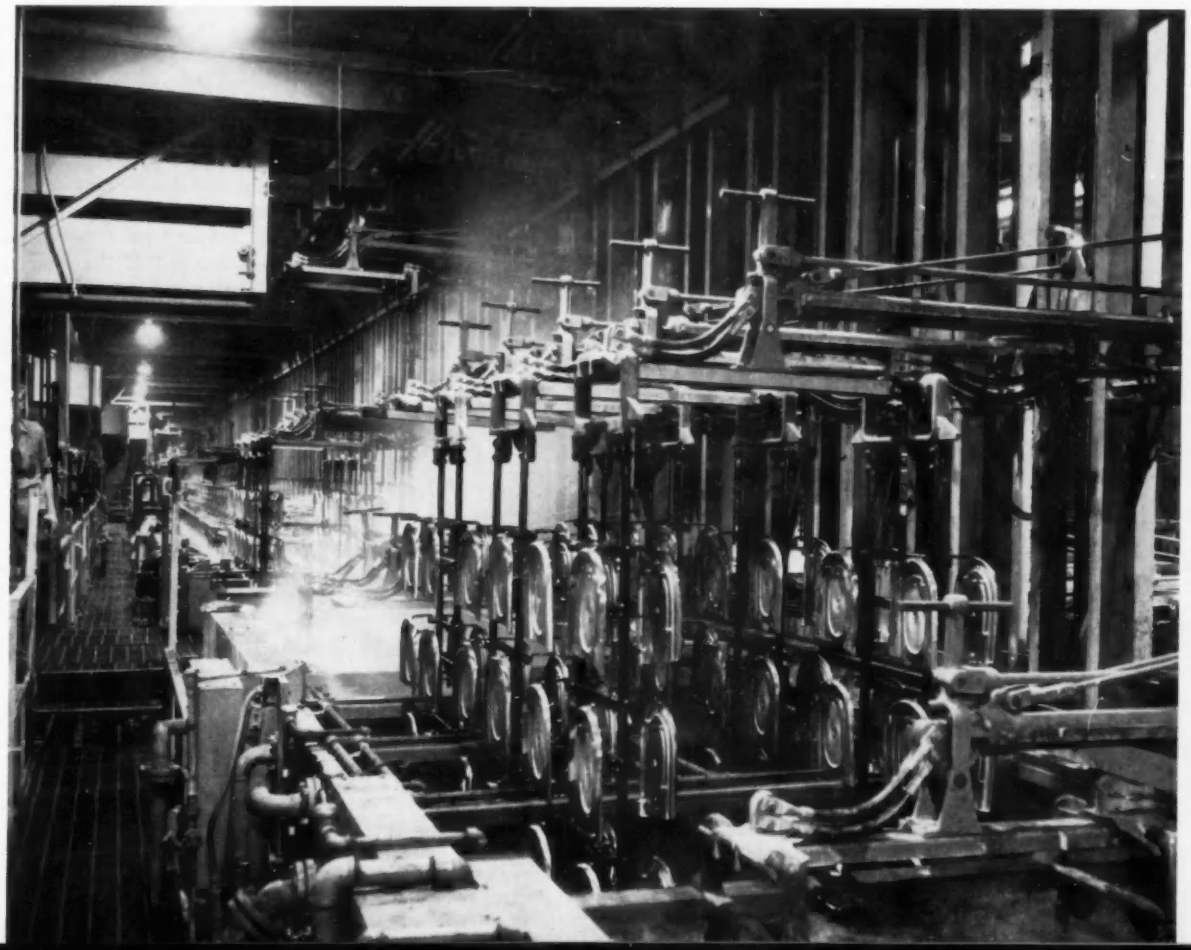
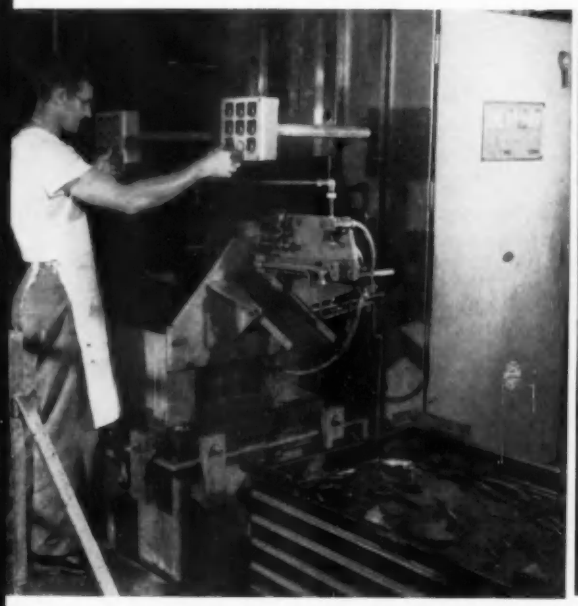
Looking down the long Hanson-VanWinkle-Munning electroplating machine.





Detroit vertical surface broaching machine for broaching gear teeth in the window regulator sector.

After broaching, window regulator sectors move to the General Electric induction hardening machine where the teeth are heated and quenched.

A noteworthy feature of electroplating in this plant is an increasing use of the so-called "white brass" which is used in place of nickel in the tricoat plating cycle. It is claimed that this procedure has been most successful, providing a safety measure against any prospective shortage in nickel.

The sheet metal department is easily one of the most extensive, featuring a variety of progressive die presses. Among these are two, 500-ton Clearing presses; two, 900-ton Clearing presses; and two enormous 1500-ton Clearing transfer presses. The 900-ton Clearing presses are set up for making air cleaner housing sections.

The 1500-ton Clearing presses provide a novelty in press shop management. They are used for making garnish moldings, at a rate of 15 strokes per minute, this procedure being considered quite unique at the present time. Another interesting feature of these big presses is the use of the Sesco coil feed mechanism.

Incidentally, the plant makes four different types of air cleaners, required at the rate of some 750 units an hour. Such volume is assured by the use of transfer type presses.

In addition to the progressive die presses, the department has a battery of smaller standard presses, including two, 200-ton Clearing units; five, 75-ton Bliss; three, 125-ton Bliss; two, 150-ton Bliss presses; 250- and 300-ton Cleveland presses; and a 300-ton Verson press.

Besides presses, the department has a group of six roll-forming machines and a number of unique automatic molding bending machines which were de-

Typical of the assembly machines in this plant is this compact Link unit for producing door lock assemblies.

signed especially for this plant. As illustrated, the machine stretches the molding into form, pierces and countersinks a number of fastening holes, then parts the molding in the center.

Another noteworthy feature in connection with molding production is that all interior moldings are processed through a large unit supplied by R. C. Mahon. Moldings are placed on the built-in conveyor system, proceed automatically through an electrostatic spray booth, then continue through the Mahon drying oven. What makes the installation even more impressive is that the variety of moldings for the various car and truck divisions requires 640 different colors. Change-over from one color to another is said to take only a matter of three minutes.

The plant also has a battery of Brandes dieing presses, including three new units of 175-ton capacity, and one of 90-ton capacity.

Finally, special mention should be made of the extensive installation of Yoder slitting equipment. As illustrated, it includes a large Yoder slitter and a Yoder recoiler. The narrow scrap material is picked up at the slitting station and chopped up into short lengths for handling.

Machining and assembly facilities more or less complete the picture. One of the interesting machine operations is found in the finishing of the window regulator sector. This is prepared as a stamping and is transported to a group of two Detroit Broach vertical surface broaching machines. Here the stampings are assembled in a stack of 10 pieces and the gear teeth are broached in a single pass of the ram. Following this, the sectors are transferred to General Electric induction hardening units in which the tooth area of the sector is heated and quenched to harden.

Interspersed in various parts of the plant are painting facilities for the various painted parts such as instrument cluster housings, which are finished in color, and other parts that are black-dipped. These facilities, naturally, are served by drying ovens.

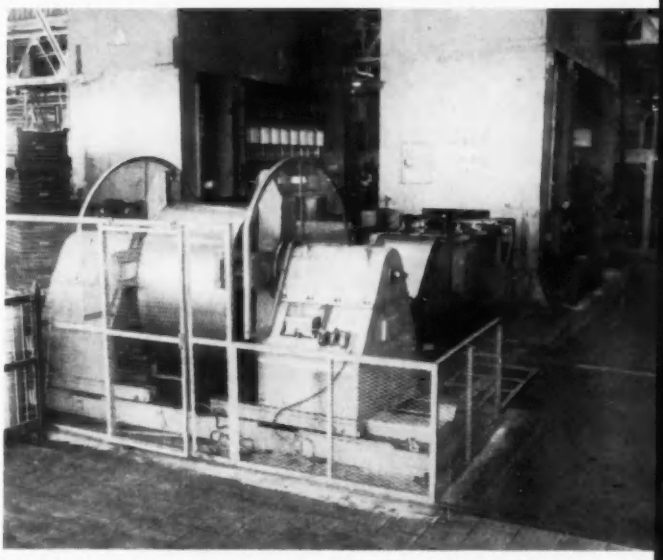
Air cleaners are painted automatically in a small Ionic electrostatic paint booth while mounted on rotating spindles on the conveyor, then proceed through an adjacent drying oven.

Since many of the components are shipped as complete assemblies, there is found a large variety of individual assembly lines as well as automatic assembly machines.

Ford has a single operator tending the scrap gallery. As a hopper is filled, he moves it to a storage area near the melting furnaces where the scrap is held until it is called for by the furnace operator. For an operation of this size Ford management believes this procedure is simpler and more economical than a scrap conveyor installation.

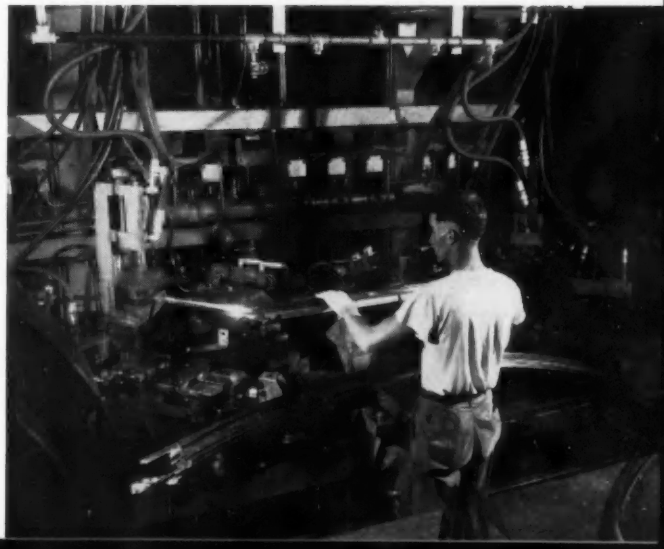
Adjacent to the die casting departments is an extensive buffing area. It is equipped with the familiar Hammond double-end buffers; and boasts an impressive battery of new Acme automatic buff-

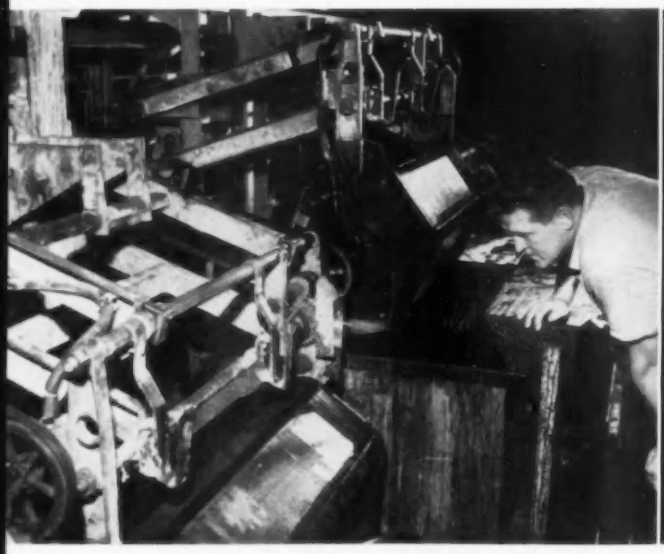
A portion of the monorail conveyor transporting zinc die castings from the die casting department.



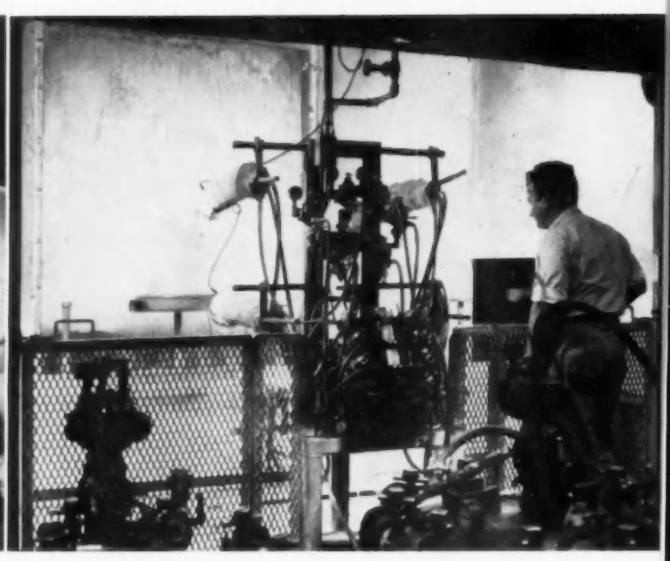
The 1500-ton Clearing progressive die presses seen in this view are served by an installation of large Sesco coil feeders.

This molding bender, designed by Ford engineers, stretches the molding to form, pierces and countersinks a number of holes, then parts the molding in the center.





Close-up of one end of the large Udylite barrel plating machine for small parts.



The electrostatic paint booth for finishing air cleaners. Mounted on rotating spindles, the units are transported through the booth and into the adjacent drying oven on a conveyor.

ing machines. Because of the large variety of plated parts—both zinc die castings and steel stampings—processed here, the management found it expedient as well as economical to reduce buffing operations to the minimum. Consequently, they have eliminated initial buffing of some steel parts, relying on the copper coating for cover. With this procedure they buff only the copper coats. This also reduces handling since the plating equipment is located some distance from the buffing room.

One of the important features of the Acme automatic buffing machines is the provision of electronically-controlled spray guns for applying the required amount of buffing compound on the individual wheels. Each of the Acme machines is capable of handling over 650 pieces an hour, depending upon size.

As might be expected, plating facilities are of the most modern types available and quite extensive to handle the volume of product. For one thing, there are two large Hanson - VanWinkle - Munning automatic plating machines—one for zinc die castings, the other for steel parts. In addition, there is a large Udylite automatic barrel plating machine for small parts; and a Meeker automatic plater for another group of parts.

• • •

Buick Suggests Port-of-Entry List Prices for Opel Caravan

Buick Div. has announced suggested port-of-entry list prices for the Opel Caravan, which some 2900 Buick dealers will market during 1958. The Caravan is a two-door station wagon with two seats and a 34 cu ft storage space.

Prices range from $2194.45 in the Atlantic and Gulf Coast states to $2376.59 on the Pacific Coast. When the Caravan becomes available in the Midwest next spring, suggested port-of-entry list price will be $2263.31.

AMC To Sell Old Hudson Plant To Group For Shopping Center

American Motors has agreed to sell the former Hudson main plant on Detroit's East Side to a group of businessmen who are planning a shopping center for the site. The plant has been virtually idle, except for some defense work and other minor operations, since Hudson assembly was integrated with Nash assembly at Kenosha, Wis.

The demolition of buildings is under way, and actual sale will take place some time after the land is razed. No purchase price was disclosed. The plant includes more than 1 million sq. ft., covering 20 acres.

Detroit Diesel Begins Work On 289,000 Sq. Ft. Addition

Detroit Diesel Engine Division of General Motors has begun construction work on a 289,000 sq ft addition at its main manufacturing facilities in Detroit. The addition will boost total floor space to 1.52 million sq ft.

According to general manager Clyde W. Truxell, an entirely new production system, including two new assembly lines, will be installed. The division already uses three assembly lines. The expansion program is expected to be completed next May.

With the new building, all engine assembly will be separated from machining operations.

Last Two-Seat T-Bird Built, Ford Now Producing '58 Model

The last two-passenger Ford Thunderbird was checked off the assembly line Dec. 16, and Ford is now producing the new, long 1958 model. A total of 53,166 two-passenger models were produced over a three-year period.

The new, four-passenger Thunderbird is being built at the Lincoln plant at Wixom, Mich. Division officials expect first-year production will double 1957 production of about 18,000 cars.

Report from the

FARM EQUIPMENT INDUSTRY

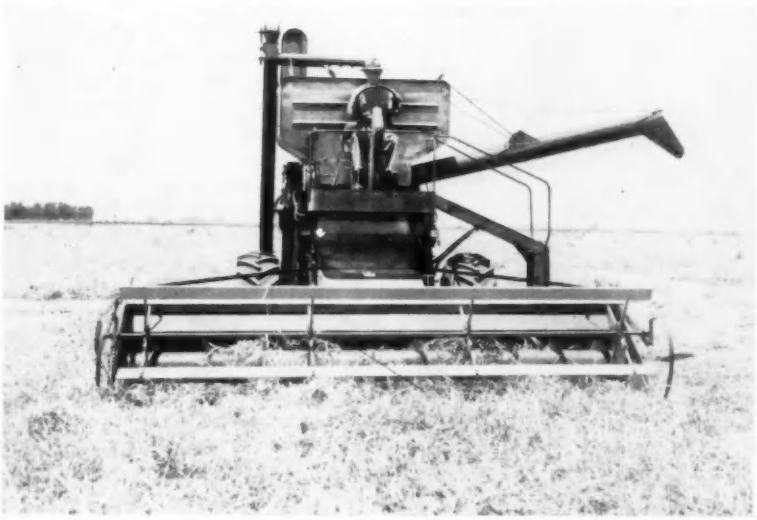
By Kenneth Rose

SPEAKING before the National Agricultural Credit Conference in Chicago, Nov. 21-23, William J. Klein, vice-president and director of sales for the Tractor Group, Allis-Chalmers Mfg. Co., pointed out some of the factors that make the farm a promising market for powered equipment. In 1940, less than 13,000 farms had gross sales of all farm products of over $25,000. By 1954, the number had increased to 134,000. The number of farms in the $10,000-$25,000 class had increased from 46,000 to 449,000. Although the increases are somewhat less in lower income categories, one must go all the way down to the $1200-$2599 group before an actual decrease is recorded. Actually, the decrease in number of farms today as compared with 1940 is almost entirely in the $250-$1199 income bracket.

Because statistics for all farms are lumped in many agricultural reports, he said, and we are told that the number of farms decreased about 22 per cent, from more than six million to about four million eight hundred thousand from 1940 to 1954, few people realize what has been happening to the larger farms. The number of farms larger than 1000 acres increased 30 per cent during this period, and other large farm categories increased also. About two million farms, less than half the total, make agriculture a going business, producing 88 per cent of cash farm sales and making 85 per cent of farm purchases from industry.

From 1940 to 1956, the number of tractors on farms increased from 1,545,000 to 4,450,000. During the same period the number of corn pickers rose from 110,000 to 700,000, and the number of combines from 190,000 to an even million. The same thing happened to balers, forage choppers, blowers, milking machines, farm trucks, and other mechanical items. With a life expectancy of about 10 years for a tractor, a production of 445,000 tractors per year would be needed for replacement alone—well above the farm equipment industry's level of operations for the past five years. Capital availability could do much to bring annual replacement to where it belongs.

This is the 16-ft John Deere Combine at work in down-and-tangled barley.



New Deere Equipment

DEERE & Co. has announced a new Self-Unloading 110 Chuck Wagon Mixer-Feeder, intended to take the hard work out of feeding. It mixes feeds and delivers fresh chopped hay and corn from the fields into bunks through a roller-chain-driven, side-delivery conveyor. Silage is delivered to or taken from silos. Ground grains are spread on top of the load and beaten into the forage by three beaters.

Material can be delivered from side or rear into blowers, elevator hoppers, trench or bunker silos. Five conveyor speeds are provided, with control from a single lever. The feeder-mixer is attached to either truck or tractor.

A somewhat similar attachment for John Deere's Model "N" PTO manure spreader is the self-unloading forage box attachment. Chopped material can be unloaded from this attachment, side or rear, into blowers, elevator hoppers, trench or bunker silos, and from the side into feed bunks.

John Deere has also announced the largest self-propelled combine ever offered grain growers. It is designated 95 by the company, and has a 14-ft, 16-ft, or 18- ft platform. Behind the platform is a 40-in. feeder, a 40 by 22-in. threshing cylinder, a 40-in. separator providing

(*Turn to page* 108, *please*)

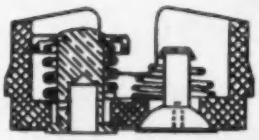
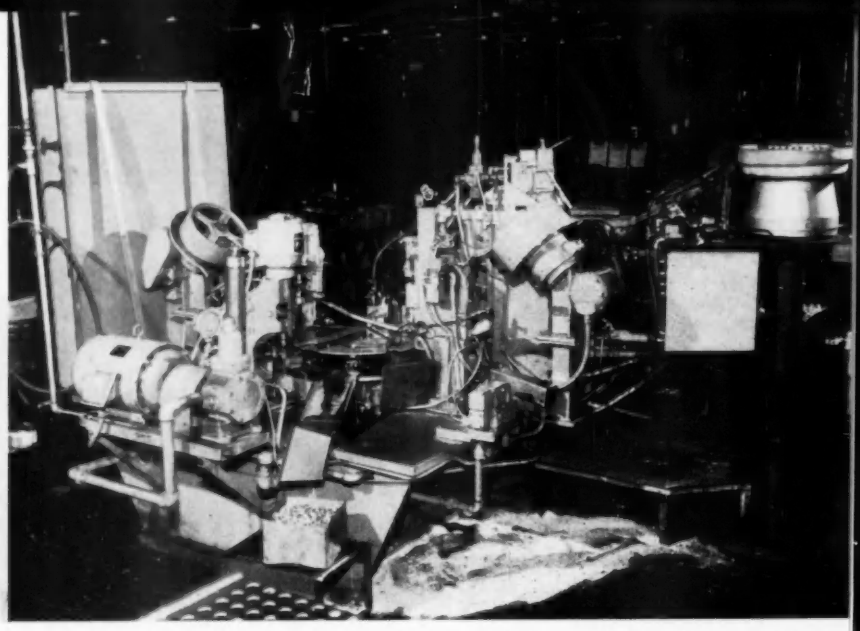


Fig. 1—Valve assembly in the compression head



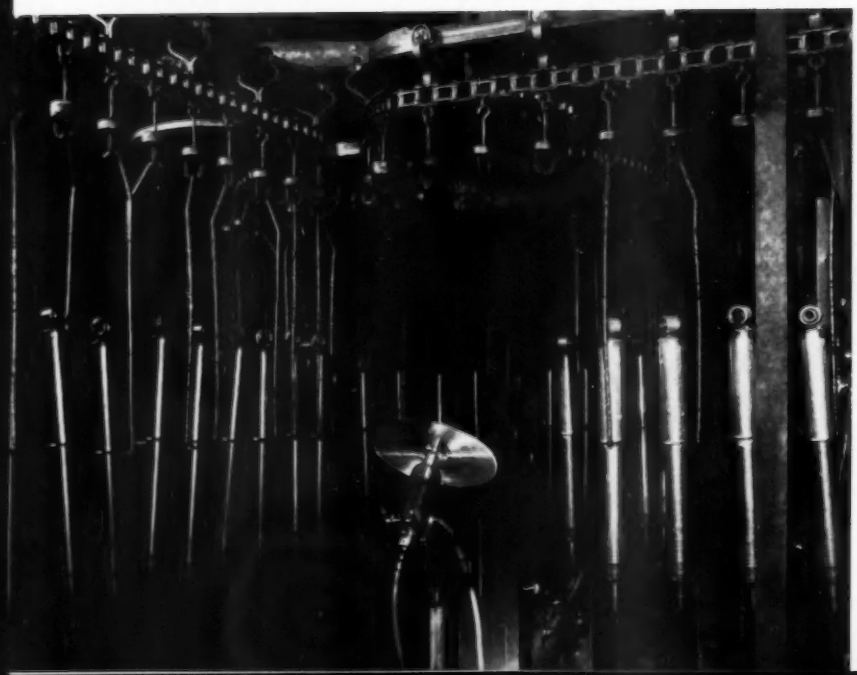
One of the complex assembly machines for automatically producing valve assemblies.

Advanced Equipment Increases

SKILLFUL management of manufacturing facilities has made it possible for The Gabriel Co. of Cleveland to boost productivity to 40,000 shock absorbers per day, almost doubling the former capacity without any increase in floor space.

The management moves that made such accomplishment possible may be of interest to all independent parts makers. It was done by selective, spot automation in various directions; by studying each operation; by installing conveyors wherever this would reduce manual effort and improve or expedite a given operation; by providing new, single-purpose machinery at strategic points where it would surely pay off; and by the installation of a well chosen group of advance type automatic assembly machines.

View taken inside the Ransburg No. 2 type electrostatic spray booth set up for painting shock absorbers. The spraying cycle is completely automatic and the economical coating of parts is done by means of the centrifugal disk technique.



While these were some of the specific moves, it is obvious that controls were exercised in other directions to improve operations and to increase the productivity of individual operations as well as the overall result. Since this is a continuing process at Gabriel, other specialized machines should be in the picture, as time goes on.

In making these moves the management has not produced dramatic changes nor has it changed the basic concept of making shock absorbers. In view of this, we have selected a few examples of advanced techniques to illustrate what has been accomplished. At the same time, these examples point to the objectives of the plant manage-

The Kaufman automatic tapping machine on piston bodies. The pair of spindles at the left drills the holes; the pair at the right handles tapping.

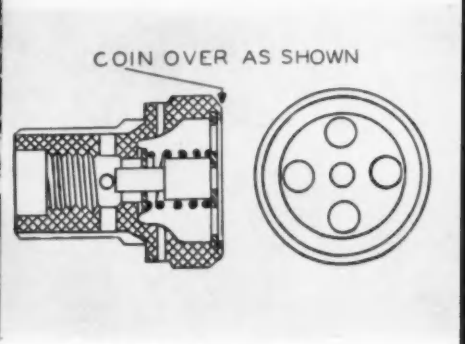


Fig. 2—Piston sub-assembly

Production of Shock Absorbers

ment in planning the future course of action.

Consider first of all the making of tubular parts. Gabriel does not employ tube mills but buys all of its tubing. However, when it comes to cutting tubing to design lengths, they have come up with techniques worth noting. As illustrated, they have a number of Grieder tube cut-off machines, each one capable of cutting 4000 pieces an hour. Tubing for the hydraulic section of the shock absorber must be held accurately for length within close tolerances. To accomplish this, the Grieder cut-off machine shown here works in conjunction with an automatically-operating attachment which has a four-spindle head for burring both ends of the tube. Before tubing enters the burring station, each piece is automatically gaged for length and only accepted tubes are permitted to enter. Rejects are shunted to one side. This process, simple as it may be, not only controls quality but it reduces the overall cost of finished tubing ready for assembly.

The making of valve assemblies, piston assemblies, and other parts usually involves the hand assembly of stacks of spring-loaded sub-assemblies. This is both painstaking and time-consuming, best handled by women operators with good hand skills. Gabriel has just introduced three small but complex assembly machines capable of producing such sub-assemblies automatically. Since the equipment is costly, additional applications will depend entirely upon the economics of a given part. It may be noted that displacement of labor is not a

One example of the Grieder high speed cut-off machine coupled with mechanism for feeding and gaging tubing, and an attachment for burring both ends of the tube.

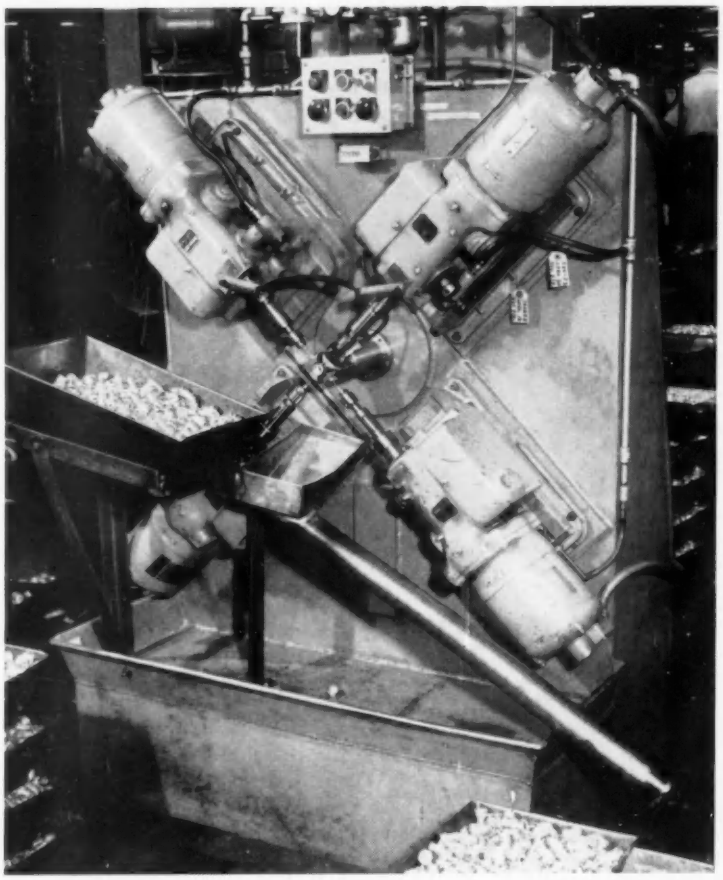
first objective. Expensive equipment is installed only when it is justified on the basis of competitive cost on parts requiring high volume.

Assembling the spring-loaded valve at the left in the valve assembly, Fig. 1, is done in an automatic machine. The valve at the right is still assembled by hand methods. The assembly machine has individual hoppers and feed mechanism for each of the parts—the valve body, the valve pin, valve spring, and the two washers. All of the feeding devices are fully automatic except the one for the small spring. This one is magazine-fed by hand simply because it is cheaper to do it this way than it would be to develop some intricate method of feeding the springs without tangling. At the assembly table stations the various parts are installed in proper sequence and the last station handles the riveting of the valve pin to effect permanent closure.

Valve bodies, as well as piston bodies, are zinc alloy die castings. Fig. 2 is a drawing of the piston sub-assembly, another of the parts in which the valve assembly is produced in an automatic assembly machine. In machining the piston body, Gabriel has introduced the Kaufman four-spindle reaming and tapping machine illustrated here. The first two spindles handle reaming, the other two are for tapping. The operation is completely automatic.

Another feature is the drilling of four holes through the wall of the piston body. These holes range in size upward from 0.030 in. diameter and are drilled in one setting in the unique Kingsbury four-spindle drilling machine seen here.

Piston shafts are produced in conventional fashion and are finally centerless-ground and centerless-lapped in Cincinnati centerless grinders and lappers. Surface finish is held to a range of four to five microinches. While the grinding operation remains unchanged, the flow of work has been greatly expedited by the installation of a conveyor system onto which the three lines of Cincinnati equipment discharge the finished shafts for transport to the assembly lines.



Special Kingsbury four-spindle drilling machine for drilling fine holes in valve bodies.

At the present time the piston shafts are cut to length and threaded in large automatics. The company is planning to install shortly some new and more compact machine tools which will cut off and roll the thread on the end at an extremely high rate.

The painting of assembled shock absorbers has been placed on a highly mechanized basis by the installation of the Ransburg No. 2 type electrostatic spray booth, using the disc-spray method. Shock absorbers enter the spray booth directly from the final assembly lines, then continue on the conveyor system for 90 minutes for air drying. This drying period is quite productive. Not only does it eliminate the need for drying equipment; it also serves to provide a period for proof-testing the hydraulic sealing of the unit. As the drying cycle is completed, the shock absorbers continue on the conveyor, passing an inspection station where an operator makes a visual check to make sure there is no oil leakage.

The parts continue past inspection and finally enter the shipping area. Here they are diverted, according to schedule, either for shipment to OEM customers or for service. Units for OEM shipment are simply loaded into containers on pallets. Service units, on the other hand, must be squeezed to closed position, then packed and sealed in appropriate packages.

Gabriel has employed automatic packaging machines for some years. But the earlier models were not nearly as automatic in action as are the more advanced machines. They perform all of the packaging and sealing functions automatically. The only manual operation is that of sliding the shock absorber into the carton at the proper station.

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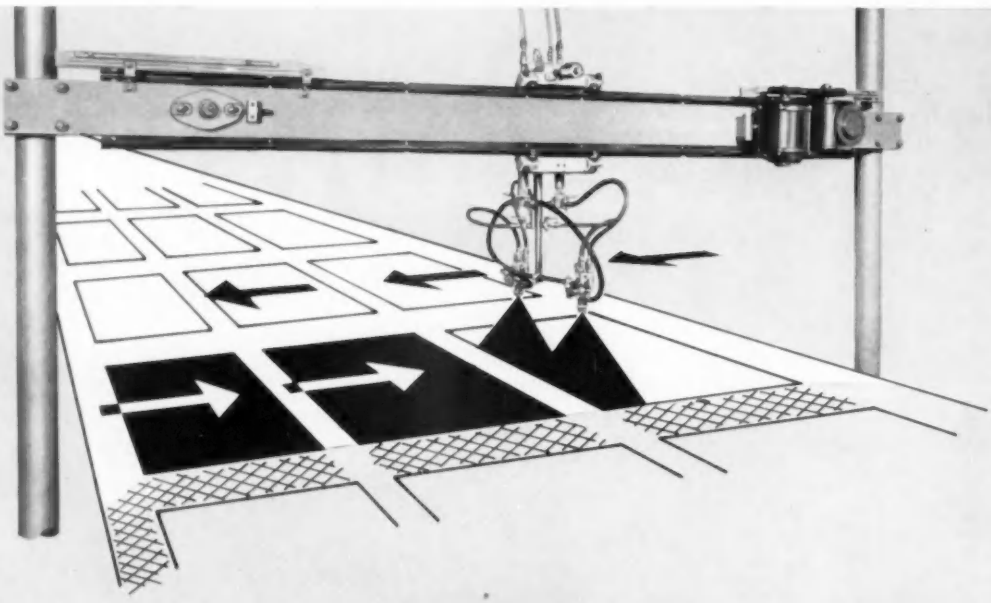
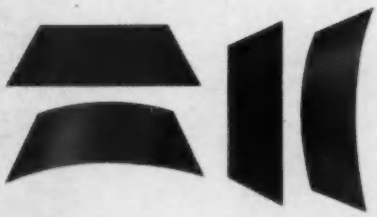
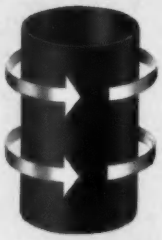


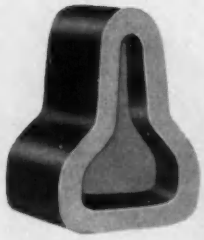
DeVilbiss Automatic Spray Machines, in three basic types, feature speed of application and uniformity of finish not possible by any other coating method.



1. Automatic Transverse Machines coat flat or contoured shapes—from wall board to auto bodies—on horizontal or overhead conveyors.



2. Automatic Rotary Machines spray all types of small shapes with ultra-fast-drying materials—from lighting fixtures to miniature railroad cars.



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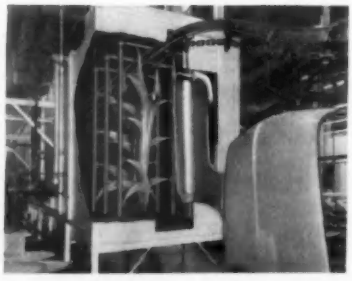

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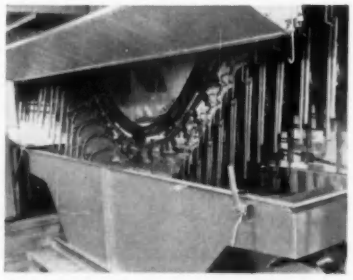

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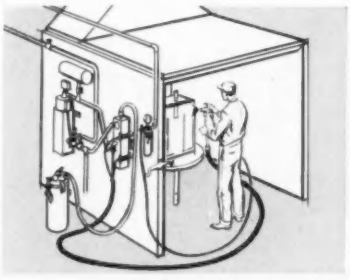

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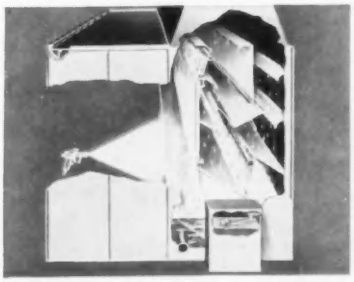

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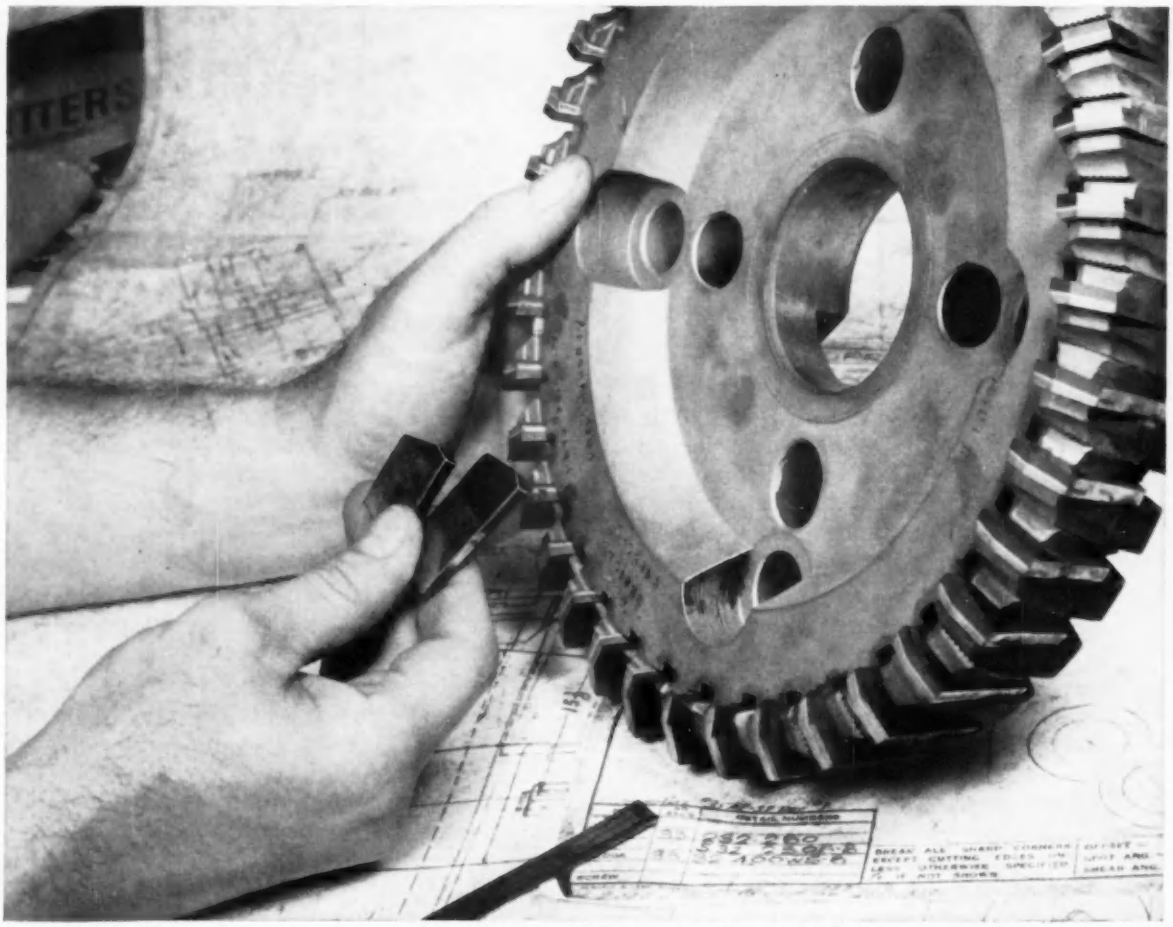

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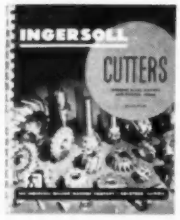

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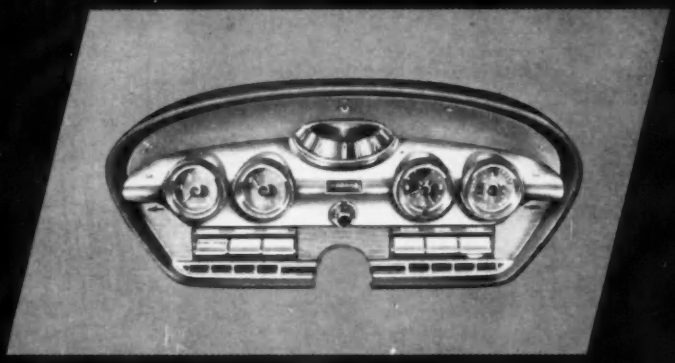

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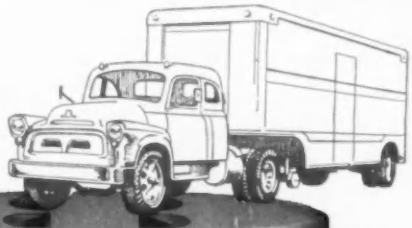

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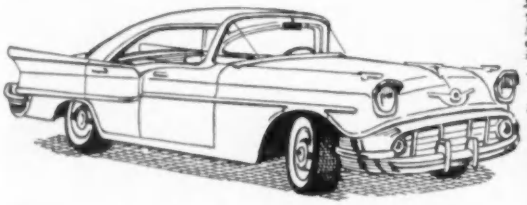

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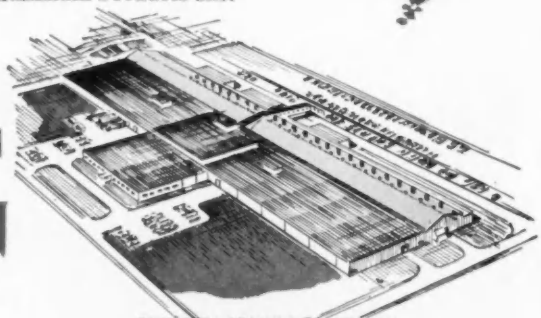

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WORLD'S LARGEST MANUFACTURER OF ALUMINUM ALLOY PISTONS

News of the MACHINERY INDUSTRIES

By Charles A. Weinert

Military Leaders, as of Now, Are Keeping the Machine Tool Industry in the Dark Concerning Plans for Tool Buying in the New Fiscal Year

Government Tool Buying Still Under Wraps

Prior to January, 1957, the Government always indicated in its annual budget how much money was tagged for machine tool buying. Starting a year ago, the amounts allocated for this purpose were not revealed—"security" being given as the reason. As a result, it was not possible to find out how much the Government proposed to spend, or how much it was permitted to spend, on machine tools. The same "secretive" policy is apparently being continued this year.

Congress has begun its look at Defense Dept. proposals for spending close to $40 billion in the year opening July 1. Pentagon officials will be going to Capitol Hill before long to defend their reasons for the projected outlays. But they now are mum about their ideas for ordering defense production tools.

Individually, the services have these answers to questions on prospects for tool purchases:

Army—We don't know yet what we're going to buy. Our technical services will submit their separate projects to Dept. of the Army for approval. When these have been judged we'll know what the Army as a whole will want to order.

Navy—Our budget categories are still too broad to permit machine tool plans to be identified. We don't have a breakout of dollars for tools, at this time.

Air Force — Individual items aren't now tagged by name in our budget. The department will have to hold off naming any amount for new tools until we give budget testimony to Congress.

Closest identification of proposed tool programs is under the budget heading, "production equipment and facilities." The full budget requested by the Defense Dept. for the new year includes planned spending of $368 million under this heading. Because the service requests for new money in this category add up to only $259 million, more than $100 million of spending money would have to come from carried-over or transferred funds.

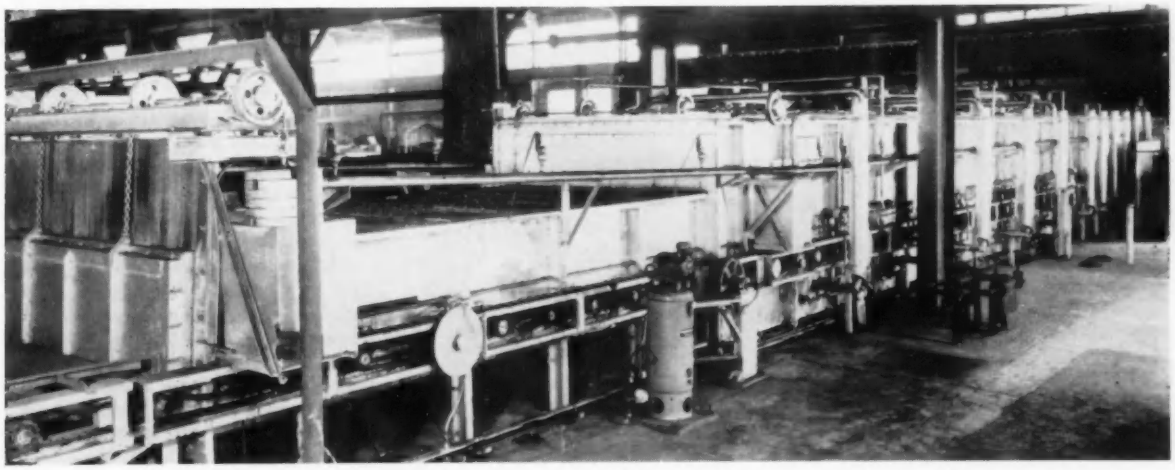
The $368 million proposed for spending is divided as follows: Air Force, $234 million; Army, $84 million; and Navy, $50 million. A very large part of these funds, though, would be spent for permanent facilities, rather than for tools.

New Annealing Setup for Seamless Tubing

Ohio Seamless Tube Div. of Copperweld Steel Co. has revealed a new setup for high-volume annealing of 52100 and similar grades of high carbon alloy steel seamless

(*Turn to page* 105, *please*)

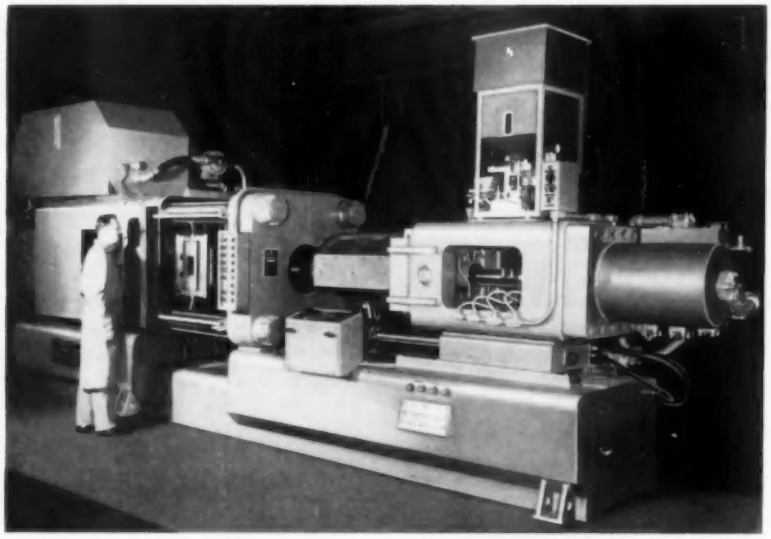
This controlled-atmosphere roller-hearth furnace for annealing high carbon alloy steel seamless tubing is now in service at the Ohio Seamless Tube Div. of Copperweld Steel Co. Having a furnace chamber of 70 ft long and 7 ft wide, it can process three or more layers of tubing at one time. The nitrogen atmosphere is supplied by a 6000 cu ft-hr unit



NEW PRODUCTION and PLANT EQUIPMENT

FOR ADDITIONAL INFORMATION, please use reply card on PAGE 89

Plastics Injection Molding Machine, 650 Ton



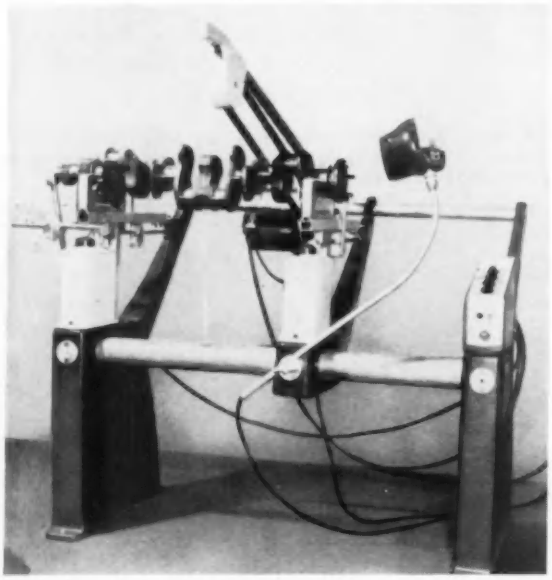
H-P-M 32/42-oz plastics injection molding machine with hydraulic injection assembly

FEATURES of a new plastics injection molding machine include an injection rate of 2510 cu in. of material per minute; over 300 cycles per hour; a mold mounting area of 30 by 48 in.; a full hydraulic clamp with 30-in. stroke and 50-in. daylight. Clamp controls are centralized. Independent clamp and injection circuits allow simultaneous traversing of both clamp and injection rams.

The high-speed injection system provides dual injection speeds, dual independent pressure settings and automatic unloading of high volume pump. This 650-ton unit with a total of 107½ hp incorporates a compensating type automatic weigh feeder as standard equipment. The 300 lb per hour capacity plasticizing chamber is equipped with three heat zones, each pyrometer controlled. *The Hydraulic Press Mfg. Co.*

Circle 30 on postcard for more data

Light-Weight Precision Industrial Balancer



Stewart-Warner precision industrial balancer balances automotive and truck crankshafts kinetically and dynamically at mechanical resonance of the rotor and vibratory system

A LIGHT-WEIGHT precision industrial balancer has been designed with weight and size ranges for specific use in automobile and truck engine balancing, plant maintenance, quality control and short-run production lines. Designated Model 702, it is capable of balancing to 0.004 oz in. all rotating parts weighing between ¼ and 300 lb, with diametral range of from ¼ to 30 in. Features of the unit include fast set-up, no special tooling required, no critical alignment, no coupling to drive required and precision sensitivity. *Alemite Division of Stewart-Warner Corp.*

Circle 31 on postcard for more data

Automatic Die Stops

AUTOMATIC die stops equipped with brackets that permit mounting on either the top or front of a die are offered in three sizes; 3/16 by 5, ¼ by 6 and ⅜ by 9 in. The stops provide a completely automatic method for stopping stock at the proper index during strip or coil feed stamping operations. The unit may be used with right or left-hand stock feed and is actuated by either a trip spring or bolt-mounted on the punch holder. *Danly Machine Specialities, Inc.*

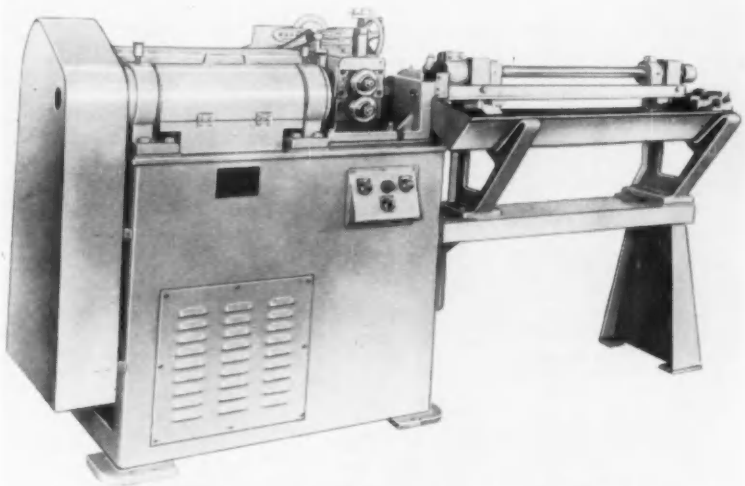
Circle 32 on postcard for more data

Low Lift Hand Trucks

MECHANICALLY and hydraulically operated non-motorized hand lift trucks capable of handling both skid platforms and pallets, according to design, are available in a number of sizes and types. The pallet models are standardized in industry with forks 36, 42 and 48 in. long. Capacities of the trucks range from 1000 lb in the mechanical lift to 10,000 lb in the hydraulic multiple stroke lifts. *Automatic Transportation Co.*

Circle 33 on postcard for more data

Automatic industrial low lift hand truck



Mettler variable speed automatic wire straightening and cutting machine machine, Model 2AV

Variable Speed Wire Straightening and Cutting Machine

A WIRE straightening and cutting machine named the 2AV cuts and straightens wire ranging in diameter from 1/16 to 5/16 in. Features of the unit include a high-speed type straightening arbor with five elongated split-dies mounted on ball bearings for minimum vibration. Variable speed units provide a choice of feed ranges from 50 to 200 ft per minute. The feed roll housing is totally enclosed with shafts mounted on Timken Bearings; an angled electric control panel is included. *Mettler Machine Tool, Inc.*

Circle 35 on postcard for more data

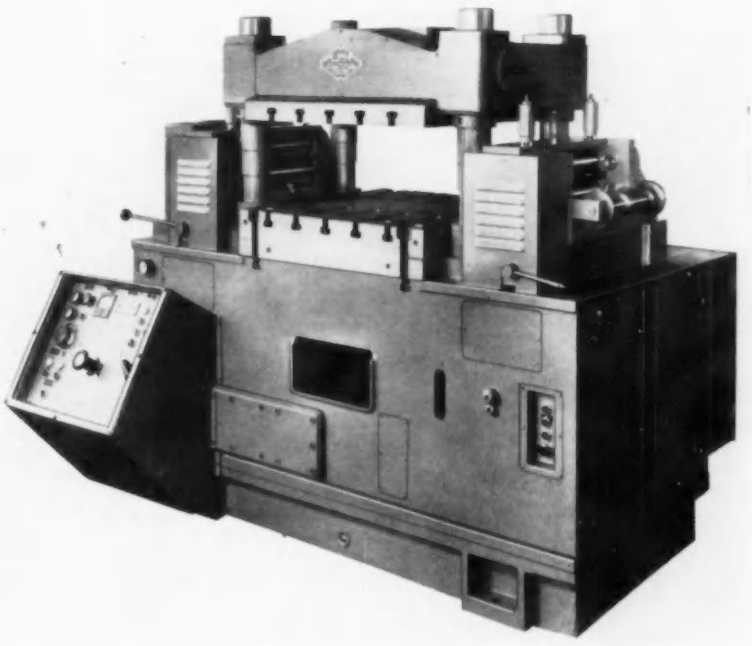
High-Speed Automatic Stamping Presses

PRECISION-BUILT, high-speed automatic stamping presses are available in four standard models; 75, 100, 150 and 200 ton capacities. Each of the four models feature a four post guide to the upper platen, and capacity point loading can be handled anywhere along the center line of the press, right to left and columns to columns.

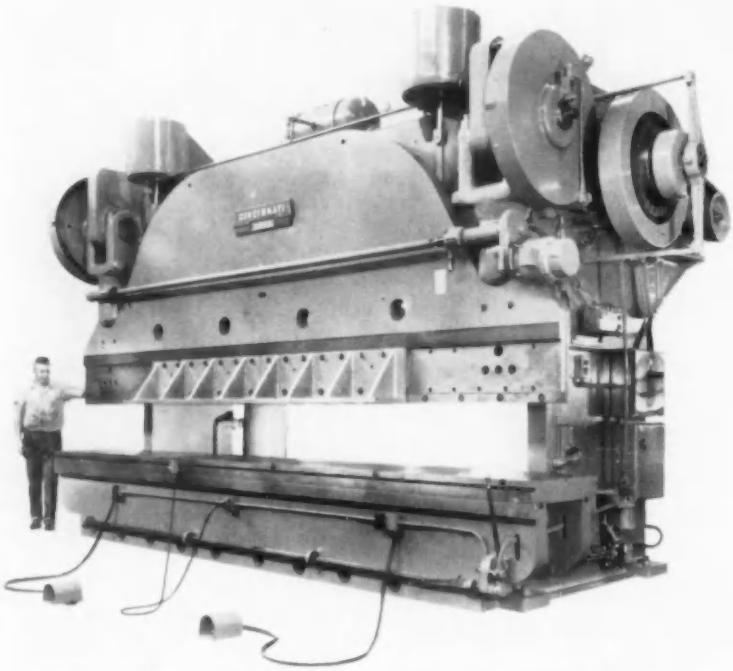
No pits are required and there is no overhead thrust on the head, because the underdrive mechanism, in the base, pulls the head down. The head rod guides are mounted in large bronze sleeve bearings, from the bottom cross beams to the head. Back gearing is of the center drive type. The pneumatic clutch and brake are a single synchronized unit. The ingoing and pull out roll feeds are designed as an integral part.

Other features are that the pitch is micro adjustable, while the press is being operated; unbalanced dies can be handled without distortion; and, there is force-feed oil lubrication to all moving parts. *Alpha Press & Machine, Inc.*

Circle 34 on postcard for more data



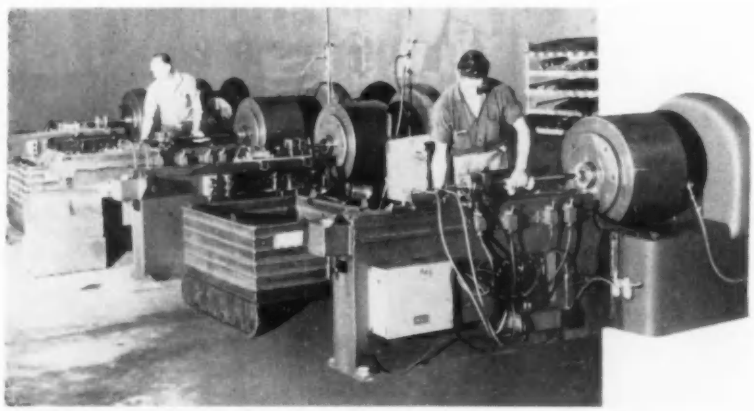
Alpha stamping press with scrap cutter that cuts scrap into feed pitch length



Press Brake Equipped With Two-Speed Transmission

Pictured is a 21 Series Cincinnati Press Brake, 14 ft-6 in. between housing, with an overall die surface of 18 ft. This machine is equipped with eight 14 in. air cushions, mounted within the double-plate bed. A combination clutch control allows a choice of manual foot-treadle operation or air-electric operation by means of foot switches. Additional features include a tonnage indicator, air counterbalances to the ram, and a two-speed transmission which permits operation at 7 or 30 strokes per minute. (The Cincinnati Shaper Co.)

Circle 36 on postcard for more data



Abbey Etna universal airdraulic feed for swagers is semi-automatic

Universal Airdraulic Feed for Swagers

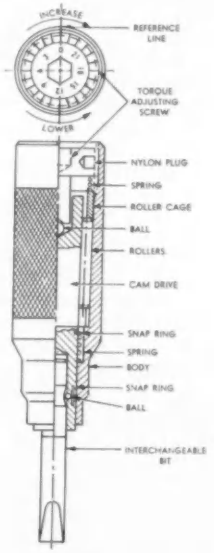
A UNIVERSAL airdraulic feed for swagers eliminates the need for hand-holding workpieces during a swaging operation. Operators position the workpieces on a chuck, and from automatic clamping to finished swaging and table return, the feed is automatic. A cam on the feed table contacts an adjustable limit switch to shift into rapid traverse. After the operation is complete the table automatically returns at rapid traverse and unclamps the workpiece. Swaging time in this application is 11 seconds. The feed can be adapted to any type of swaging operation. *Abbey Etna Machine Co.*

Circle 37 on postcard for more data

Preset Torque Screw Driver

NAMED the "Safe-Torque," a hand-operated screw driver was designed for applications requiring a specified torque. Built to industrial standards, with a roller drive clutch for applications in the range 0 to 25 lb-in., it is said to be suited for precision production and assembly jobs where air or electric powered tools cannot be used due to space requirements and safety regulations. Areas of applications include industrial instruments, aircraft controls, missiles, and electronic equipment.

Equally spaced rollers are wedged between the inner cam drive and the outer shell or body with application of



Scully-Jones "Safe-Torque" screw driver

the driving force. All parts deform elastically when rollers climb into the wedging position. When preset torque is reached, the rollers override the high points on the inner cam and roll into a "free" position so that further tightening of the screw is impossible. The operator can feel and hear this overriding action. Stripped threads and damage to screw heads are virtually eliminated because the torque setting, not the operator, determines the exact degree of tightness. *Scully-Jones and Co.*

Circle 38 on postcard for more data

Hitch-Type Press Feed

A PRESS feed arrangement, developed by Precision Welder & Flexopress Corp., hitch-feeds material at 2200 to 2500 in. per minute, with accuracy to plus or minus 0.002. This permits high speed stamping of parts with long as well as short feed increments. Feed strokes up to 36 in. are possible by this new method.

Named Flexofeed, the mechanism is extremely adaptable and flexible in application. It is not special purpose equipment. It is used in conjunction with a standard high-speed Flexopress, which uses conventional dies. The device incorporates hitch-type feed mechanism actuated by mechanical linkage driven directly from the press.

Circle 39 on postcard for more data

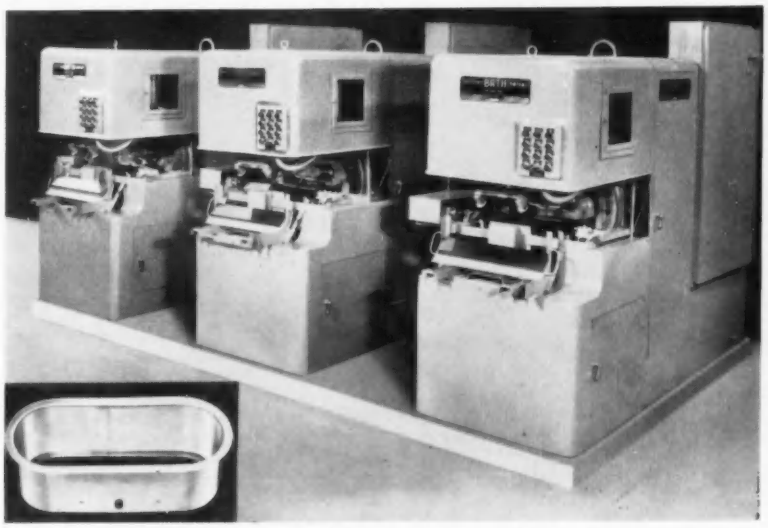
Rotary Vane Compressor

A LINE of rotary vane compressors in sizes from 400 cfh to 6000 cfh at pressures from 1 to 3 psi feature a built-in automatic by-pass regulator which maintains pre-set delivery pressure at varying outputs. The regulator is in a closed circuit of the compressor so that when output is turned down, the flow of the compressor is automatically by-passed to the input side of the compressor. This enables the output to be varied from 100 per cent to any increment.

Waukee air cooled rotary vane compressor

The units are gas tight for handling mixtures of gas and air. They can be driven by standard V-belt drive with a final driven speed of 750 to 1100 rpm, depending on the size of the compressor and the pressure. A standard 1750 rpm motor can be used. *Waukee Engineering Co.*

Circle 40 on postcrad for more data



Cyril Bath automatic former turns out air inlet ducts at the rate of 1500 per hour

High Speed Former Produces 1500 Pieces Per Hour

A HIGH speed automatic former produces air inlet ducts at the rate of approximately 1500 pieces per hour. The progress of forming work through the machine is automatically timed and cycled. There are three forming heads so that any difficulties in one head-unit will not stop the whole line.

Stacked cross section blanks are supplied to each head on interchangeable loading hoppers. All remaining phases of operation are automatically cycled throughout. The blanks are separated and moved to a pre-load station where they are accurately positioned prior to insertion in the forming dies. The blank is then transferred to the forming position while a previously formed part is being ejected. Provision for automatic stop is provided if double or oversized blanks should be loaded into the forming dies. Moving parts are pressure lubricated. *The Cyril Bath Co.*

Circle 41 on postcard for more data

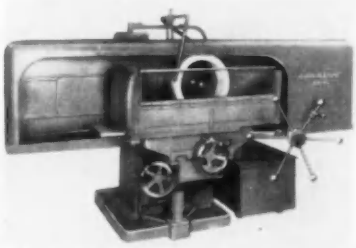
Blast Cleaning Machine

LOADS of castings, forgings and heat treated parts weighing up to six tons can be blast cleaned in a 72 cu ft Rotoblast barrel developed by the Pangborn Corp. The unit will clean a six ton load of castings in five minutes. The 72 Type GN barrel is equipped with two Rotoblast wheels, each capable of throwing 120,000 lb of abrasive per hour. Each wheel is powered by a 40 hp motor. Heavy-duty motors are also utilized to power the shake conveyor, the barrel door and the abrasive elevator. All operations on the barrel including loading, starting, stopping and unloading are automatically operated from a control panel. The barrel is 21 ft-55 in. wide by 10 ft-11 in. deep by 23 ft high.

Circle 42 on postcard for more data

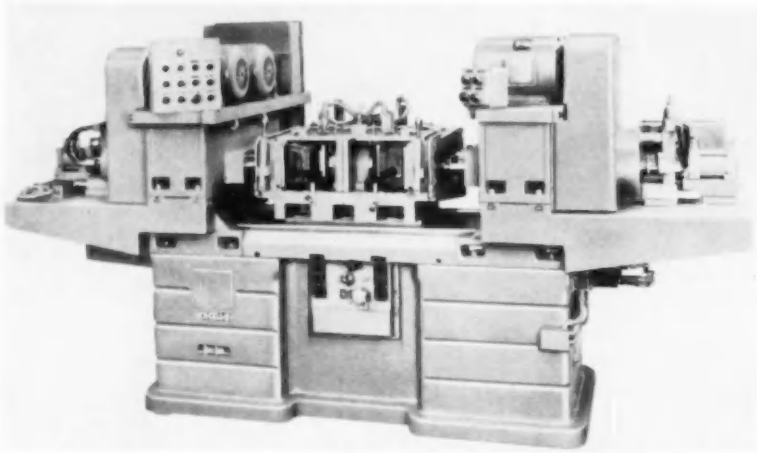
Powered Face Grinder

THE Abrasive 18 in. face grinder is now available with power feed to the table. A hydraulic power system with a 2 hp, 1200 rpm motor provides the equivalent of a 50 lb push at the handwheel, which amounts to 600 lb at the table. Maximum cutting speed is 25 fpm and the return is 42 fpm. The power unit is interlocked with the table handwheel. It has a 15 hp, 900 rpm heavy-duty motorized spindle. Applications include grinding automobile dies, plastic molding dies and all types of forging dies. *Abrasive Machine Tool Co.*



Abrasive grinder with power feed to table

Circle 43 on postcard for more data



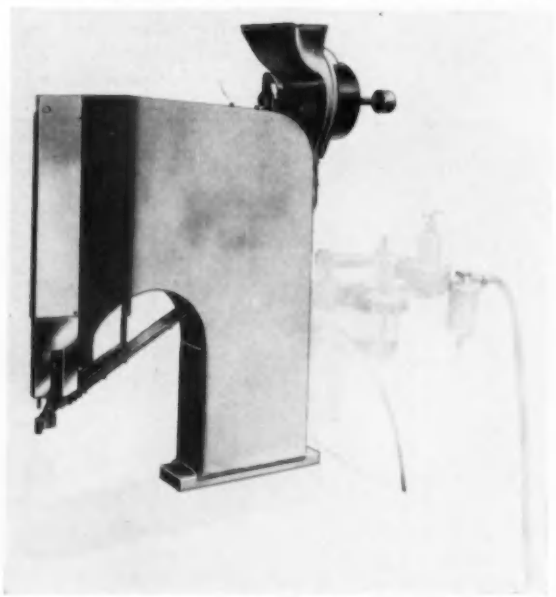
Ex-Cell-O boring machine, Style 17-A, equipped for bor-drilling cylinder head guide holes and plunge-facing the valve seats at a net production rate of 23 per hour

Precision Boring Machine Bor-Drills Cylinder Heads

CONCENTRICITY of valve seats and guide holes on automotive cylinder heads can be obtained by use of a standard Style 17-A precision boring machine that features the Bor-Dril process. Functioning in a dual capacity, the unit feed plunge-faces the intake and exhaust valve seats and Bor-Drils the valve guide holes from the solid. Net production is 23 cylinder heads per hour. Except for loading and unloading, the machine cycle is completely automatic. Independent loading and unloading of the two compartment fixture permits continuous operation. *Ex-Cell-O Corp.*

Circle 44 on postcard for more data

High Production Riveters for Automation Lines



Milford high production riveter, when equipped with quick change raceways, will set tubular steel rivets ranging from 0.058 up to 5/32 in. in diameter. The units can be arranged for automatic cycling and part feed.

BENCH-TYPE, pneumatic riveting machines, 3¼ in. wide, set tubular-steel rivets up to 5/32 in. in diameter and ¾ in. long on as small as ¾ in. centers. They can be used in conjunction with in-line slide fixtures or rotary transfer tables for progressive high-speed production assembly operations.

The design of these Model 56 machines allows wide latitude in operation and mounting. Actuated by a pneumatic cylinder that drives the setting tool through a toggle linkage, they will operate off shop air from 60 to 150 psi. Cycling speed at the high end is limited only by the rate at which the rivets will drop from the feed rail into the jaws, and speed of stroke can be adjusted to control the impact on fragile materials such as plastics and porcelain.

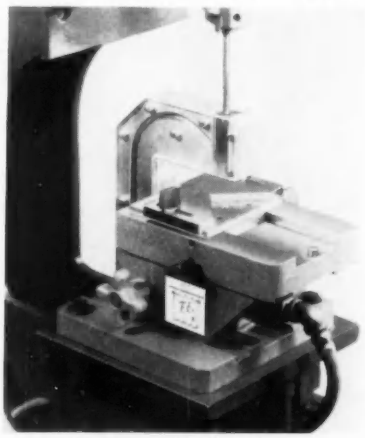
The new riveters are made of steel, and completely equipped with pressure regulator, oil mist lubricator, air cleaner, and exhaust muffler. Throat depth is 9 in.; stroke is 2 in. They measure 25 in. deep by 3¼ in. wide. When used individually, the machines can be directly connected to the shop air outlet; when used in multiples, they can be connected to a shop manifold. *Milford Rivet & Machine Co.*

Circle 45 on postcard for more data

Ballizing Fixture

A "BALL-O-MATIC" universal work-holding fixture has been designed for use in sizing and finishing holes by the ballizing process. This process consists of pressing a ball of suitable size and hardness through the unfinished hole, and provides a precision and fine finish.

The fixture accommodates a wide range of parts for ballizing holes of 1/16 to ½ in. in diameter. It can be used on an arbor press, drill press, vertical broach, or any other equipment having a vertical ram that will hold a push rod. The work is held in or on an anvil, which can be pulled forward for loading and pushed back against a positive stop to position the work for ballizing.



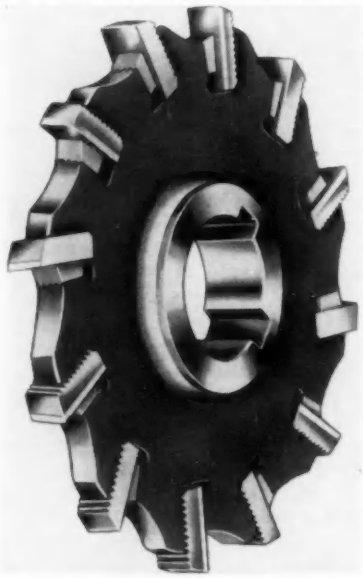
Industrial work-holding fixture

All parts are replaceable for rapid change-over. The base of the fixture is 7 in. sq; and over-all dimensions are 7 in. wide, 8¾ in. front to back and 8-3/16 in. high. *Industrial Tectonics, Inc.*

Circle 46 on postcard for more data

Tooth Slotting Cutters

NARROW staggered tooth slotting cutters for general purpose milling, named WAF Series, feature flat-faced HSS blades rigidly held in the cutter body with wedges. This is said to eliminate blade refacing after sharpening side and top, and setting out to maintain the original width of the cutter. They are made with two keyways in the hub. This permits lining up the side teeth on adjacent sides when two cutters are used for straddle milling thin parts. It also permits interlocking two or more cutters of the same OD when they are used together.



Goddard & Goddard milling cutter

Widths range from ⅜ to 1 in. Diameters range from 4 to 16 in. Cutters 5.8 in. wide and narrower are made with extended hubs, providing additional key bearing to prevent shearing while cutting. *Goddard & Goddard Co.*

Circle 47 on postcard for more data

Standard Load Switch

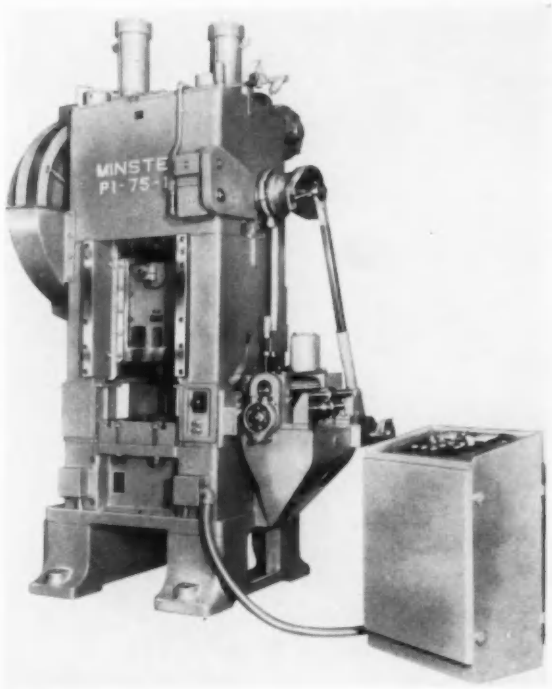
OVERLOAD conditions of both fractional and multiple horsepower electric motors can be controlled by use of a simplified standard load switch. Applications include detecting misaligned or dulled cutting tools in drilling or milling operations, overloaded conveyors, presses, cranes and mills.

Operating off 110 v, 60 cycle current, the loadswitch uses no vacuum tubes or complex electronic devices, requires only two simple adjustments to set-up, and is contained in a compact standard cabinet 12 by 14 by 6 in. The unit is made in four standard models. *J.I.C. Electric Co.*

J.I.C. standard load switch

Circle 49 on postcard for more data

Minster single point straight side P-I Piece-Maker Press for automatic production is suited for progressive die and perforating operations that involve heavy shock loads. An air friction clutch and brake provide fast action at any speed with quick, controlled stopping.



Single Point Straight Side Presses 75, 100, 150 Ton

SINGLE point straight side presses designed for automatic production are available in 75, 100 and 150 ton capacities. Applications include progressive die blanking and perforating operations that involve heavy shock load.

The box type frame is of high tensile alloy cast construction. All wear points are nickel-bronze lined. Fixed or variable speed drive is available. The single point box-type slide maintains precise slide to bed parallelism. It is equipped with eight bronze-lined ways widely spaced front to back and is guided in cast gibs. The pressures are of the vertical type but all sizes can be inclined to 27½ deg for part drop-out. *Minster Machine Co.*

Circle 48 on postcard for more data

Universal Vacuum Chuck

A UNIVERSAL vacuum chuck can handle many different sizes and shapes of work. Designated the "Octopus," it has closely set suction grips which hold non-magnetic materials firmly in place for drill press, router, bullard lathe and other milling operations. Any one or any combination of vacuum apertures can be sealed off, confining the gripping area to the work at hand.

"Octopus" chucks are made from 921-T cast aluminum tooling plate on special order in specified sizes. A magnetic chuck can be converted for working non-magnetic materials by superimposing the vacuum chuck fitted with a steel base plate. *Pioneer Aluminum Inc.*

Circle 50 on postcard for more data

NEW PRODUCTION and PLANT EQUIPMENT

Tree geared - in - ram vertical milling machine saddle is proportioned to provide longer, broader bearing surfaces in knee-to-saddle and table-to-saddle ways. The model 2VG is equipped with a built-in longitudinal table feed box which provides a range of five rates of feed and rapid traverse. The rapid traverse has a speed of 70 ipm, and can be operated when the feed is engaged. The column is a high-grade casting to provide a rugged support for turret and knee. Ample storage space for cutters, clamps and collets is provided in the storage compartment in the column.

Geared-In-Ram Vertical Milling Machine

A NEW geared-in-ram vertical milling machine named the 2VG Mill has a quill capacity to handle cutters up to four in. in diameter. The quill is driven by a three hp motor mounted on the ram. Features of the mill include an automatic collet closer, roller spindle drive and a turret lock which operates with a single motion.

The mill has 12 speeds ranging from 50 to 2500 rpm; 6 geared changes in the ram gear box, high and low range selection on head and a neutral position on the head for rotating the spindle by hand. The ram is dovetail type with an integral gear box. *Tree Tool and Die Works.*

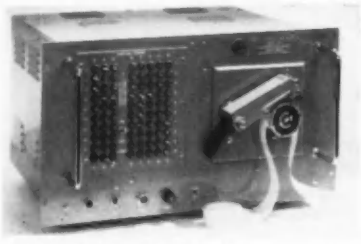
Circle 51 on postcard for more data

Tape Reader

DESIGNED for programming automatic machinery and manufacturing equipment, the Tape-Ard Reader provides 80 bits of control information for each operation. A standard, one inch perforated paper or paper-mylar tape affords a convenient means of programming and handling a fixed sequence of data. The reading head covers 10 transverse rows of 8 holes each. A panel of neon lamps duplicates the 8 by 10 hole pattern of an entire frame and is used to check newly punched tapes.

The complete unit, including the reader, tape drive mechanism, and verifier, is contained in a cabinet with a 10-½ by 19 in. panel suitable for bench use or rack mounting. Power required is 60 cycle, 375 w. *California Technical Industries, Div. of Textron Inc.*

Circle 52 on postcard for more data



California Tape-Ard Reader programmer

New Spindle Motor

A DIRECT-CURRENT motor which operates at any speed between 50 and 6000 rpm has been developed for use with a new series of three-dimensional milling machines. The variable speed of the motor allows machining of various metals, each at the most desirable speed for maximum work production and cutter life.

The motor is rated at 10 hp, intermittent service at a base speed of 1500 rpm. It delivers constant torque from 50 to 1500 rpm and constant hp from 1500 to 6000 rpm. It is totally-enclosed, liquid cooled. Outside diameter is 13½ in. overall, length is 28 in. *Allis-Chalmers Mfg. Co.*

Circle 53 on postcard for more data

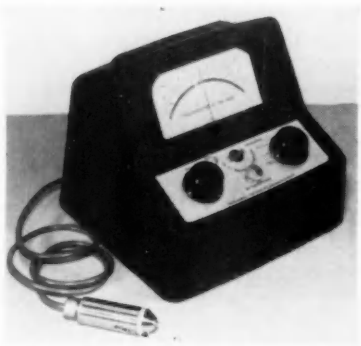
5000 PSI Hydraulic Pump

A VARIABLE delivery, variable pressure, hydraulic pump capable of pressures up to 5000 psi is designed to deliver 38.2 gpm at 3750 rpm and 3000 psi. Minimum life for steady state operation at this pressure and flow is approximately 1335 hours. At 5000 psi and 3750 rpm, delivery is about 38.2 gp with minimum life of approximately 288 hours. Handwheels provide ready manual adjustment of maximum pump delivery and maximum load pressure. Remote control can be arranged by attaching flexible shafts. *Vickers Inc.*

Circle 54 on postcard for more data

Electronic Comparator

QUICK, accurate process gaging on the machine or at the site of operation can be obtained by use of an electronic comparator consisting of two basic parts; a gaging head with a steel tip that is placed in contact with the work piece, and an amplifier unit. The amplifier unit records the magnified movement on an easy-to-read dial. The needle repeats its reading in 1/20 of a second when used on the same or dimensionally equal parts. Cradling of the hardened steel tip absorbs shock from over and under sized pieces. Operational pressure never exceeds three oz. Tips of different materials and contours are available for various applications. *Threadwell Tap & Die Co.*

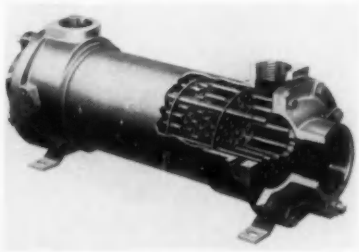


Threadwell S.I. electronic comparator

Circle 55 on postcard for more data

Heat Exchanger

TYPE BCF heat exchanger is now offered in 46 sizes; one, two and four pass designs; and 1.2 to 124 sq ft of heat transfer surface. Features include new baffle structure with a flanged lip at each tube hole and around the outer edge to give tighter tube fit and improved thermal characteristics; stamped steel feet movable in three positions around the



Ross Type BCF exchanger comes in 46 sizes

hubs for easy, more adaptable mounting and corrosion resistant copper alloy core assembly.

Designed for cooling lube oil, jacket water, hydraulic and other fluids, as well as many process heating applications, the BCF is used on engines, compressors, turbines, hydraulic machinery, machine tools and fluid drives. *Ross Heat Exchanger Div. of American Standard.*

Circle 56 on postcard for more data

Gear-O-Mation multi-function parts - handling device air-cleans, orients and elevates castings in automated lines at the rate of about 150 parts per hour in the three steps of its sequence

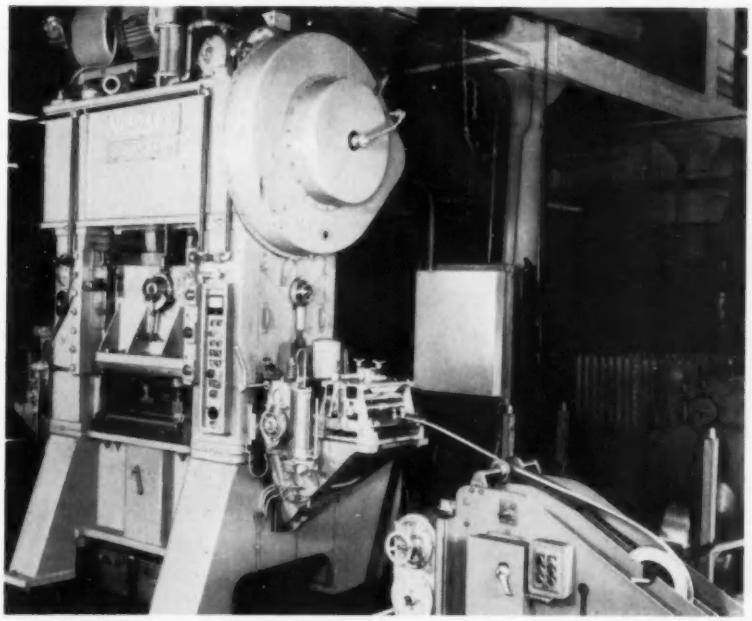
Castings Air-Cleaned, Oriented, Elevated In New Unit

MACHINED castings, such as pump housings, can be air-cleaned, oriented and elevated by use of a new multi-function parts - handling unit. This machine is designed for in-line processing of pump housings and handles 150 eight-lb castings an hour through a three-step sequence.

A glass door at the front of the unit provides visual inspection. Drive is from a fractional-hp motor through electric reducers. Elevator height, capacity and feed rate are completely variable to suit the application. The unit is ruggedly built with JIC circuits throughout. *Gear-O-Mation Div., Michigan Tool Co.*

Circle 57 on postcard for more data

High Production Presses Combine Automatic Coil Feed



Niagara automatic press features heavy, vibration free construction and coil feed

HIGH production presses equipped with automatic coil feed and press-mounted controls and devices perform blanking, forming, drawing and perforating operations in long or short runs. Known as the series SA-2 Automatic, these two-point straight-side all-steel presses are of heavy, vibration-free construction.

The automatic feed permits coil stock to be fed at speeds up to 100 fpm. A patented roll-lifting system is built into the press for independent adjustment of ingoing-outgoing rolls from floor level. Built with shaft diameters from 4½ to 9 in. the presses are available in capacities from 60 to 200 tons (non-geared), and 75 to 300 tons (geared models). The electro-pneumatic friction clutch operates directly on the crankshaft. *Niagara Machine & Tool Works.*

Circle 58 on postcard for more data

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Free INFORMATION SERVICE

Use either of these postcards for Free Literature listed below, or for more information on New Production Equipment and New Products described in this issue.

USE THIS POSTCARD

FREE LITERATURE

Die Set Accessories 1

Catalog 70-A, Section 5, eight pages, describes a line of die supplies including specifications on hard steel drills, transfer screws, layout fluid, die rubber, various types of screws and bolts and related equipment. *E. W. Bliss Co.*

Carbide Tool Catalog 2

Catalog 12 shows a complete line of carbide cutting tools ground with a micro-finish edge to give a long cutting life. *Dixie Tool Industries.*

Silicone Catalog 3

Properties and applications of Silicones are contained in 16 page catalog prepared to be used as a 1958 reference guide in the selection, performance and related data of Silicones made by the *Dow Corning Corp.*

Drilling Accessories 4

Bulletin AC, 12 pages, discusses the complete line of accessories for drilling and tapping machines offered by the *Edlund Machinery Co.*

Index Table 5

A four page bulletin describes a point to point positioning Jacy Precision Digital Index Table built to machine tool standards and featuring infinite resolution from 1 to 21,600 minutes of arc. *Modern Engineering Service Co.*

Air Starting Motor 6

Form 5094D, 20 pages explains a complete line of air starting motors for starting Diesel, gasoline and natural gas engines. Detailed specifications and mounting dimensions are included. *Ingersoll-Rand Co.*

Axial Compressor 7

Design and construction features of a line of axial compressors available in sizes from 8000 to 1,000,000 cfm are contained in bulletin 16B8863. *Allis-Chalmers Mfg. Co.*

Production Presses 8

Catalog 57-2, 12 pages, describes a line of two point, back gear, under drive production presses with capacities from 75 to 200 tons. *Alpha Press & Machine, Inc.*

Measurement Gages 9

A precision groove gage for "O" Ring grooves and snap ring and bores is explained in a two page folder prepared by *Mueller Laboratory.*

Heat Treating Method 10

Folder T-620(17), 12 pages, describes "The Tricarb Heat Treating Method." This equipment features "Microcarb" atmosphere control, "Speedomax" temperature control and a controlled quench. *Leeds & Northrup Co.*

(Please turn page)

VOID After Apr. 1, 1958 **2/1/58**

Circle code numbers below for Free Literature, New Plant Equipment, or New Product Information

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Drill Jig Bushings 11

Catalog 35875 covers a complete line ASA and standard drill jig bushings. Aircraft type bushings in press-fit types, a 5/32 in. OD group of press-fit bushings with holes as small as 0.0152 in. and one in. OD groups of head and headless press-fit bushings are described. *Ex-Cell-O Corp.*

Welding Catalog 12

Revised 24-page catalog, 2300, on Heliwelding lists items such as the Model HMC-A Heliweld Weld Cycle Control, Model H20-A Manual Heliweld Holder Pack, Model SH25-C Aircospot Gun, Model SHC-B Aircospot Grater Eliminator Control and Ground Finish Tungsten Electrodes. *Air Reduction Co., Inc.*

Quick-Opening Fasteners 13

Three separate lines of quarter-turn fasteners called Q-1, Q-2, and Q-4, are described in a 24 page catalog named, "Quick Fasteners." Dimensional data, installation instructions and where-to-use information is included. *Fastex Div. of Illinois Tool Works.*

Metalworking Presses 14

Twelve page bulletin 7.13 describes applications and advantages of double and triple action hydraulic four column metalworking presses for versatile deep metal drawing. It includes illustrations and specifications of a line of presses ranging from 75 to 4000 tons. *Lake Erie Machinery Corp.*

USE THIS POSTCARD

Steel Tubing 15

Technical working data on a line of mechanical steel tubing are contained in a 12-page catalog. Tables showing size range, cutting and size tolerance of round tubing; size ranges, radii of corners and tolerances of square and rectangular tubing are also contained. *Brainard Steel Tubing Div., Sharon Steel Corp.*

Wear Parts 16

Wear parts made of BR4 steel are described in a 20 page catalog. Diagrams showing shapes and sizes of such parts as shot blast liners for shot blasting equipment, plow and pug mill tips and chute liners are contained. *Latrobe Steel Co.*

Cork Cushions 17

Bulletin VC-501 discusses Vibracork, a vibration, shock and noise controlling material recommended for massive, difficult to isolate machinery. *The Korfund Co.*

Open-Die Forgings 18

Open-die forging facilities available to industry are described in an eight page illustrated bulletin. Forgings in a variety of shapes and sizes from 300 to 30,000 lb made from carbon and leaded steels are also shown. The bulletin describes testing procedures applied to all forgings, and lists other tests available at customer specifications. *Alco Products, Inc.*

Flexible Couplings 19

An eight page bulletin, No. 10100, tells how to select couplings suited to more than 150 different service applications. The coupling is designed to withstand all combinations of misalignment and the end float will absorb up to 15 per cent of torsional shock. *T. B. Wood's Son's Co.*

Snagging Wheels 20

Snagging wheels, for the removal of metal surface imperfections, are described in a four page bulletin. Illustrations show typical applications on small castings and steel slabs, and the available range of standard wheel shapes. *Simonds Worden White Co.*

Pump Castings

A 20 page booklet titled, "Meehanite Pump Castings," explains pump castings and the various pump types that use Meehanite castings. Also included are tables that illustrate property evaluations made from tests covering wear, resistance to acid corrosion, impact and erosion. Address request on company letterhead to *Meehanite Metal Corp.*

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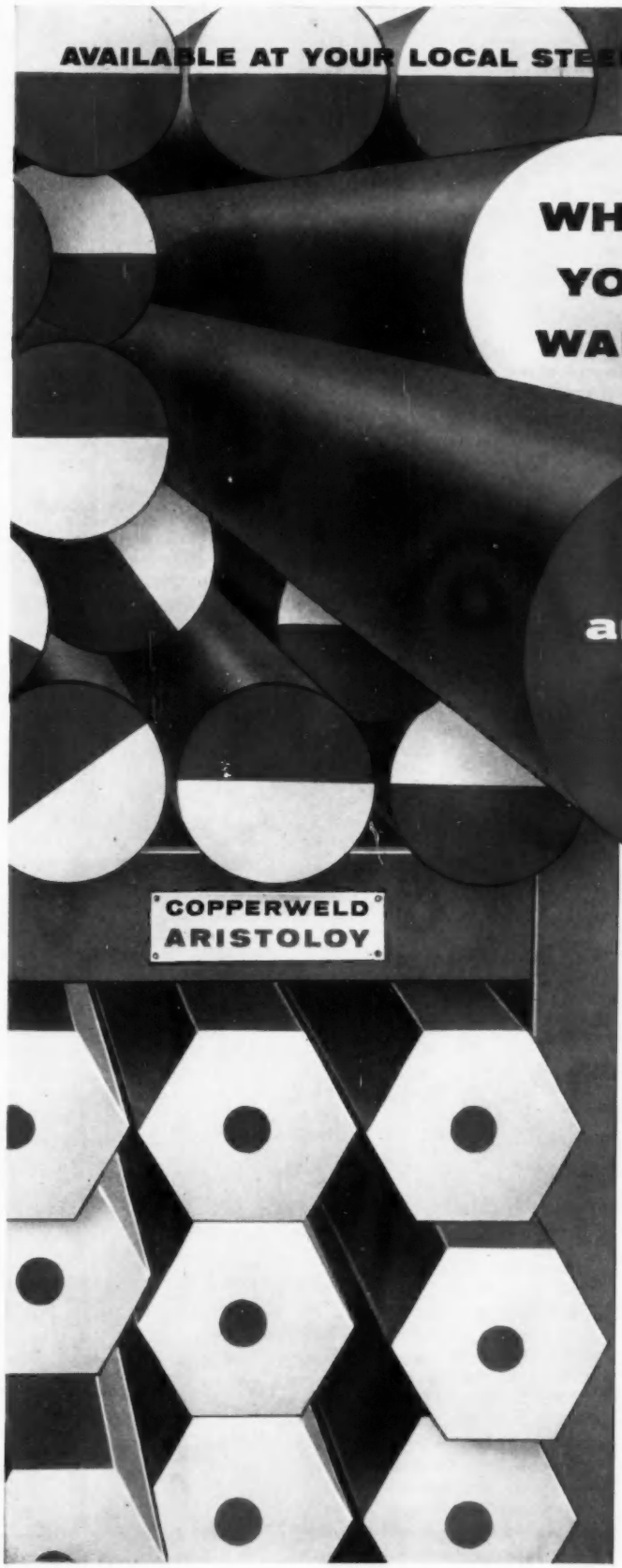
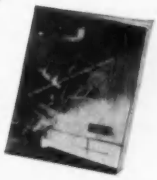


Today's steel warehouses, scattered across the country, provide fast truck delivery of Aristoloy bars, hexes and rounds, in a wide range of A.I.S.I. grades and sizes. A telephone call to one of these modern steel service centers will put you in touch with an immediate source for most of your steel needs. Your local steel warehouseman can ease your inventory burden and the expense and trouble of stocking these items. He is also well equipped by training and experience to offer technical advice . . . to assist you in selecting the best Aristoloy to do your particular job.



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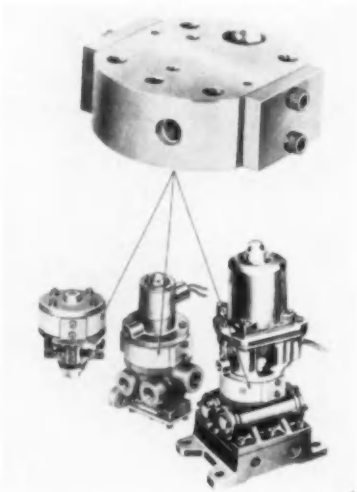
NEW PRODUCTS AUTOMOTIVE-AVIATION

FOR ADDITIONAL INFORMATION, please use reply card on PAGE 89

Air-Index Adapter

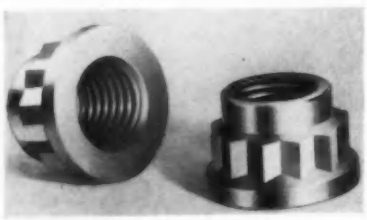
An air-index adapter can convert a series of long-life valves to momentary action. The adapter can be inserted between any Ross Skyline series head and body combination to provide a new approach to momentary valve action. Used in a single solenoid valve, the valve reverses and stays put each time the solenoid is energized. Used with an air operated valve, the valve reverses and stays put with each pilot air impulse. Main application for the Double Stroke Adapter is where double solenoid operated momentary valves are now used. *Ross Operating Valve Co.*



Circle 60 on postcard for more data

High-Strength Locknut

A lightweight, high-strength 12-point external wrenching locknut has been designed for critical airframe fastening applications. The one-piece, all-metal locknuts, designated 42 FLW, are rated at 180,000 lb per sq in. minimum tensile strength and come in diameter sizes from ¼ through ½ in., National Fine series.



The Flexlocs are made of alloy steel, either plain or cadmium-plated, with molydisulfide coating optional. They are rated for temperatures up to 550 F. A solid locking collar, squeezed inward in three places to provide vibration proof locking action once a bolt is threaded into the nut is featured on the new design. *Standard Pressed Steel Co.*

Circle 61 on postcard for more data

Pneumatic Spring Control

A complete line of pneumatic spring controls has been designed for installation as overload or stabilizing units on new automobiles. The units consist of heavy butyl chambers which fit inside the coil springs and inflate with air to bear against the coils. This is said to eliminate all "bottoming" on bumps and stops sway, sag and dip on curves, turns and stops. Air pressure can be easily adjusted to compensate for overloads or to restore original riding level in cases of weakened springs.

For installation as rear overload supports on cars with leaf springs, the units come equipped with coils and brackets to mount between leaf springs and frame. Use of extension air hoses permits adjustment of pressure at rear bumper and convenient release of pressure for normal ride when not overloading. *Air Lift Co.*

Circle 62 on postcard for more data

Liquid Pressure Control

An all-bronze, high-capacity, automatic by-pass valve regulates liquid pressure as supplied by pressure pumps. In operation the valve is set to open at the required pressure and when the system demand is reduced the excess liquid is by-passed back to the supply. The valve is available in two sizes, ¾ and 1 in., for pressures from 10 to 250 psi. *Watts Regulator Co.*

Circle 63 on postcard for more data

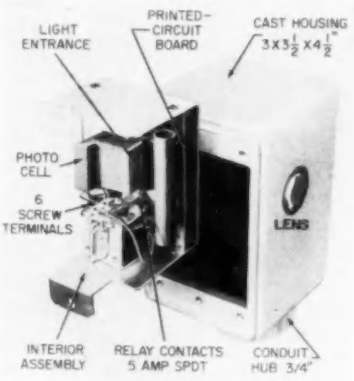
Compression Brake System

The Power Brake Equipment Co. is offering an anti-jackknife safety system which employs the venturi principle to bring multiple axle vehicles to smooth, straight stops. Air flows to the rear where pressure forms and moves forward to apply the brakes starting with the last axle first and thus keeping trailing vehicles in line at all times. Brake release is in exactly the opposite sequence.

Circle 64 on postcard for more data

Photorelay

The printed-circuit of a photorelay adapts it to use on material-handling, packaging and processing machinery,



where there may be dust, vibration, humidity or severe voltage fluctuation. The entire unit is mounted on a single board and clamped in a stamped-metal cradle. The relay contacts are large; suitable for any counting, control or detecting circuit.

Compactness and highly-directional response to about 10 ft-candles of light make it suitable for direct use on all types of conveyor machinery, tow-line systems and many similar purposes. Operation is from 100-130 v, 50-60 cycles. There is no amplifier tube, no time delay for warm-up and no internal heat. *Photobell Co., Inc.*

Circle 65 on postcard for more data

Pressure Switch

Model RR-30, a sub-miniature pressure switch for use under vibrations up to 1000 cps, 7g was designed to hold plus or minus 0.5 psi accuracy from —85 to 200 F. The switch comes

in nominal pressure settings from 5½ psia to 23½ psia and has a two psi differential between "ON" and "OFF." The device will not chatter at the operating points and meets applicable sections of MIL-E-5272A.

It is particularly suited for use on aircraft, missiles or vibrating equipment. Model RR-30 weighs 2 oz and is 2-7/32 in. long by 1-5/32 in. in diameter; 28 vdc, 110 vac, 5 amps non-inductive, SPST or SPDT. *Newark Controls Co.*

Circle 66 on postcard for more data

Hydraulic Control Valves

A line of 600 to 4000 psi cylinder operated hydraulic control valves was designed for use where high-speed response, maximum compactness and employment of higher valve operating pressures are desirable. Use of an integral double-acting cylinder for valve operation is said to reduce valve mounting space requirements to a minimum and to afford split-second response due to positive pressure ac-

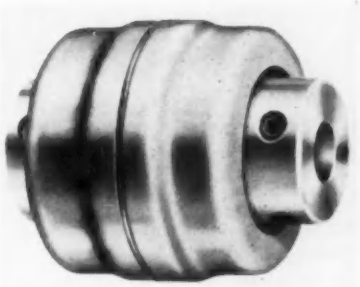
tuation in both directions. Valve operating pressure range is 60 to 140 psi, using air, water or oil.

Available in 2 or 3 way types, adaptable for either NO or NC operation, depending on piping connections, the valves are suitable for leak-free control of water, glycol or oil base hydraulic fluids. Port sizes of 1, 1½ and 2 in. NPT are offered and valves are fitted for remote pilot control. *Sinclair-Collins Valve Co.*

Circle 67 on postcard for more data

High Torque Couplings

Metro-Flex couplings were designed to handle angular misalignment of driving and driven shafts up to 5 degrees, parallel offset to as much as 0.010 of an in. and axial end play up to 0.090 of an in. They provide constant rotational velocity, transmit torques up to 150 oz-in., permit speeds to 10,000 rpm and operate over a



temperature range of —10 to 250 F.

Hardened steel balls and raceways are featured on the units. They are being offered with hubs bored to receive 3/16, ¼, 5/16 or ⅜ in. shafts or combinations of these shaft sizes. Overall diameter of the coupling is 1.078 in. *Metron Instrument Co.*

Circle 68 on postcard for more data

Universal Joint Bushing

A universal-joint, steering-column bushing designated as U. S. 9517-D1 Pyrotex, having applications in the truck and farm-implement fields, is made of non-woven asbestos felt, compounded to produce desired friction ranges. Dimensions of the bushing are 0.735/0.737 of an in. OD by 0.4855/0.4875 of an in. ID by 0.375 of an in. long. Applications generally call for four bushings per vehicle. *Raybestos-Manhattan, Inc.*

Circle 69 on postcard for more data

Chemical Blanket

A chemical blanket developed for use on hot phosphate coating baths acts as a barrier to prevent the escape of steam and fumes. Named Serseal, it has also shown reductions in time required for maintenance of heating elements. Heat savings up to 70 per cent have been reported in actual field use. Since the bath is sealed, there is little escape of fumes and vapors and in many cases ventilating systems can be eliminated. *American Chemical Paint Co.*

Circle 70 on postcard for more data

METALS

Steel Costs Mount as Operating Rate Drops to 57.5 Per Cent of New 1958 Capacity. Copper Cut to 25¢ per Pound

By William F. Boericke

Steel Output Slumps

By mid-January all hope of a speedy recovery from the usual lull in production during the holiday had all but vanished from the steel industry. Production had fallen to a weekly output of 1,548,000 tons of ingot steel, compared with a rate of 2,519,000 for the same week of 1957, according to the American Iron & Steel Institute. This amounted to an operating rate of 60.5 per cent of 1957 capacity of 133.5 million tons, or about 57.5 per cent of the new 1958 capacity of about 141 million tons. This was down more than one-third from the 1957 record. Many steel plants were operating at the lowest level for the last 10-15 years, except during strike periods.

While to some extent expected, the decline was greater than anticipated. Some commentators described the situation as "terrible." It was commonly overlooked that even the current operating rate was yielding as much steel as peak capacity a decade ago. Nor was it sufficiently emphasized that actual steel consumption was considerably more than the operating rate would indicate because users were drawing down heavily on their inventories instead of placing orders. According to a statement by a U. S. Steel official, shipments were 10 per cent below actual consumption on this account.

Hard Selling in Order

True as this may be, it did not alter the hard facts that orders were for smaller tonnages, that extra charges were eliminated, that freight absorption was pretty near universal for sheet, strip, and bars, and was fairly prevalent for structurals and light plates. Layoffs of labor and shutdowns of production facilities featured newspaper headlines. New orders, anxiously awaited, were too often offset by cancellations and requests for holdup of deliveries. *Iron Age* commented that demand for steel from Detroit was so disappointing that 15-25 per cent of steel ordered for January delivery had to be re-shuffled. Employment of basic steel workers was off about 60,000 men and 100,000 were working on a short week schedule.

Zinc Statistics Again Disappointing

It has become an old story to report that zinc statistics continue to reflect an unfavorable aspect for the industry. The December figures were anything but cheerful. Stocks rose more than 14,000 tons to 166,500 tons, the highest since 1953, while unfilled orders fell to the lowest level in years. Demand for Special High Grade held up relatively better than for Prime Western. The average daily rate of production increased in December, although it was less than the average for the year.

Only the prospect of higher domestic tariffs for lead and zinc has kept the 10½ cent price for zinc and 13 cents for lead from further declines. With zinc selling in London about 7¾ cents a pound, foreign sellers can realize a profit of about 1½ cents a pound by selling in New York at 10½ cents after paying freight, handling, and present tariff. With lead in London about 9 cents a pound, and 13 cents in New York, there is a profit of about 2 cents a pound after similar charges for bringing in the metal. There is scant wonder that domestic producers are crying to high heaven for relief. They have received loud support from certain members of Congress. Senator Murray has declared, "The maximum relief that the Tariff Commission can grant lead and zinc industries will be insufficient to put them on a sound basis."

Inventory Cutting Continues

Blame for the slump in demand was placed principally on excessive inventory accumulation, which in retrospect was overdone in the first half of 1957. Most executives admit that reduction to a more reasonable level is still some months off. Not until well into the second quarter of the year is it believed that users will be satisfied and once more begin to accumulate steel. Of course, much depends on the level of general industrial activity. An inventory suited for a breathing spell, as the present recession has been termed, would be inadequate for a period of rising sales. It is also pointed out that the present high rate of inventory cutting can hardly continue very long, and that a stepped-up defense program, easier money, and larger Government expenditures for road building and construction could turn the scales earlier.

Costs Mount

Steel men are understandably unhappy over the continued price-cost squeeze intensified by the cost of living increase of 5 cents an hour instituted in January. This it is calculated will add about $46 million to labor costs, and increase direct costs of making steel about $1 a ton, and indirect costs another $1. With the present state of the steel market it would be hopeless

(*Turn to page* 96, *please*)

Cutaway section of Douglas Aircraft acoustic window used on the DC-7 below. The noise barrier is an acrylic pane (A) mounted in a foam rubber damper (B). Damper is retained in a metal pan (C). A flexible HYPALON seal (D) is compressed between the inner pane and the double thickness outer window (E). A neoprene seal (F) is cemented to the metal retainer.

Douglas Aircraft seals new acoustic window with Du Pont neoprene and HYPALON®

Douglas Aircraft has developed an improved acoustic window, designed for pressurized aircraft cabins. It is now in use on the DC-7, and a similar design will be used on the new jet DC-8. To meet the rigid demands of flight conditions, two Du Pont elastomers – neoprene and HYPALON – were selected to seal the window.

The flexible seal between the noise barrier and double pane (see D in diagram) required a resilient material with complete resistance to ozone, high color stability and low temperature flexibility without the use of a plasticizer. (Plasticizers become volatile at low pressures found at high altitudes and condense on the window panes.)

Douglas engineers chose HYPALON because it was the only elastomer to meet these specifications. HYPALON has complete resistance to ozone. Unlike most rubbers, it can be compounded in a wide range of stable colors without sacrificing its other properties. This versatile synthetic rubber resists hardening at extreme temperatures (250° F.-350° F.) and retains its flexibility at temperatures as low as –40° F. without the use of a plasticizer.

Neoprene was chosen for the inner seal (F in diagram) because of its high resistance to ozone cracking. It retains its resilient properties in the face of heat, flexing, weather and sunlight. Neoprene is resistant to oil, chemicals, abrasion and cutting . . . and will not support combustion.

Investigate the design possibilities of Du Pont neoprene and HYPALON. Neoprene is currently used in aircraft fuel line connectors, heating system hose and cable jacketing. HYPALON is used in molded and extruded parts, fabric coating and convertible tops. For more information on the uses and properties of neoprene and HYPALON, just clip the coupon below.

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City _____ State _____

METALS

(*Continued from page 94*)

to attempt to pass on these costs to the buyer by raising the price. On the other hand, in spite of hard selling, no producer could afford to cut steel prices today if he expects to operate at a profit. It seems entirely probable therefore, that just as in 1954 when the operating rate dropped to 61 per cent for a time, the price structure will remain firm. Producers are looking ahead to next July when a 7 cent an hour increase goes into effect under the labor contract. A price increase at that time will almost certainly be in order.

Scrap Prices Unsettled

After falling from a lofty $64 a ton for No. 1 heavy melting scrap, the price has slipped to about $32 with the market highly unsettled. On the West Coast, consumers' buying prices for top grade scrap slid to $30 a ton, the lowest in more than two years. Major consumers are buying only in small quantities, with very little being stockpiled. On the other hand, firmer prices were reported in Cleveland and Detroit, with Pittsburgh unchanged. However, there was no noticeable increase in demand. The scrap market is being closely watched as an indicator of future steel demand. It was all too accurate in 1957 in projecting the present decline in the steel operating rate. But scrap may lose its historical role in future, as greater reliance is being placed on hot metal instead of scrap by the mills. In 1957, scrap formed only 49.3 per cent of the total charge compared with 52.8 per cent in 1956.

Demand Is Slow

While demand for both metals is extremely slow in this country—sales of lead in the first half of January were said to be the lowest ever reported — in London prices held up firmly. It appears this was due to buying by importers to take advantage of higher prices in the U. S. These tonnages may have been stockpiled here and not offered immediately on the market, for subsequent sale when and if the new tariffs go into effect.

No Action Yet on Higher Tariffs

Great disappointment has been voiced over delay in obtaining the recommendation of the Tariff Commission which it was hoped would be released before the end of 1957. It now appears that the report may not be ready before February and the new duties may not be in effect before March or April. Confidence remains strong that the report will call for the maximum allowable of 2.1 cents per pound on zinc and 2.55 cents on lead imports in spite of vigorous protests from abroad. It seems unnecessary to add that failure to receive higher tariffs would cause collapse of domestic zinc and lead markets to levels approaching the London prices.

Copper Cut to 25¢ a Pound

In mid-January Kennecott Copper initiated a 2 cent cut in the copper price to 25 cents a pound. The 27 cent price set by the producers had held since September 7. While the move was not unexpected, the slash was more than anticipated. For some weeks there had been a wide disparity between the producers' price, the smelters price of 25 cents, the dealers price of 24¼ cents, and finally the London price of about 22-23 cents. This latter had permitted the profitable export of the metal to U. S. and had raised particular havoc with the fabricators, who were obliged to meet competition from abroad with products made from lower priced copper. Especially hard hit were those fabricators controlled by the producers themselves. Many of the independents were able to purchase foreign copper and have it converted on toll in this country, again yielding a substantial price advantage over the captive fabricators.

There is good reason to think that this last cut may prove to be the final one for copper. The 25 cent price is only one cent above the so-called peril price of 24 cents, when a two cent tariff is automatically imposed if the 24 cent price holds for 30 days. There is considerable feeling that copper users won't wait for another cut which could cost them the amount of the tariff.

Fabricators Facing Slow Demand

Business has been disappointingly slow in the brass and copper industry. The fabricators' figures were frankly bad, showing another increase in stocks, a serious decline in sales, and fewer unfilled orders. However, it has been held that much of the fabricated copper is held by subsidiaries of the larger producers, while stocks of the independents are relatively low. If this is true, the bulk of supplies are in strong hands. If the demand for copper products should strengthen, stocks of the independents would be quickly exhausted and this could lead to extended buying to replace inventories.

Nevertheless, further cutbacks in production abroad are urgently needed to bring about a balance of supply with demand. Domestic producers have done their part by cutting back 10-20 per cent of normal output. But foreign producers, principally those companies operating in the Congo, in Rhodesia, and Chile, had made no reduction by mid-January, although there were strong indications they might do so. Very likely such action would be hastened by the new cut in the copper price.

The drop in the copper price coincided with an announcement by the Chile government that it had recommended a 10 per cent cut in output by the American owned mines in that country, which could amount to about 40,000 tons a year. However it was indicated that this action would be revised if other important foreign copper producers failed to follow suit.

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PERFECT CIRCLE PISTON RINGS

Observations

By Joseph Geschelin

Navy Missiles

At a recent meeting at the Engineering Society of Detroit, the chief of BuOrd, U. S. Navy, discussed the forward planning of naval missiles. He mentioned that the Polaris missile which operates on solid fuel is being groomed for submarine launching in the future. However, because of its size it cannot be used in existing submarines but will require development of a new series of subs capable of handling missiles of this kind. Regulus II, which has a range of approximately 1000 miles, on the other hand, can be launched from certain existing submarines at the present time.

Hot Melt

Some revolutionary ideas in foundry practice will be breaking in the news one of these days. We refer particularly to the aluminum foundry operations being groomed by Ford and Chevrolet. Mention has been made of the Chevrolet Messina (NY) plant in the past although this is still in the building stages. Some prophets say that the plant will be producing aluminum cylinder blocks as well as pistons. On the other hand, Ford has a plant near Muscle Shoals already in partial operation on pistons. Distinguishing characteristic of both plants is that they are served by Reynolds refining and melting facilities built nearby. Hot metal is transported directly from the melting plant to the foundry and poured into holding furnaces. From these furnaces it can be delivered in ladles or pumped directly into the die casting machines. The most obvious money advantages come from the fact that both supplier and user reduce or eliminate handling and transportation charges while the user saves the expense of melting equipment as well as the heavy power charges for operating melting furnaces. With this setup they eliminate the making and handling of pig and ingots; simplify the problems of handling and remelting scrap.

SAE Panel

The production panel held during SAE week in Detroit had some thought-provoking comments on European industry. Up to recently American travelers have been convinced that nothing in the world approaches the advances in automotive production in the USA. Experts who have visited European plants during the past few years now assure us that their facilities for building cars and parts are as good in most respects and in some instances show things in advance of our practice. They warn against complacency. Apparently European automotive manufacturers now can show us some tricks in machine tools and manufacturing methods. It would be profitable to reverse the process and get more of our engineers over to Europe to pick up ideas that might be exploited here.

Air Cooled

At the January SAE meeting in Detroit Hercules Motors showed its new line of small aircooled engines, a line recently acquired from Lycoming. We were told that Hercules plans to add a single-cylinder model to the existing family of two-cylinder and four-cylinder V-engines. Moreover, the company plans in the near future to supply the line in a Diesel version as well.

AUTOMOTIVE INDUSTRIES KEEPS YOU INFORMED

New Products

Some noteworthy new developments appeared at the SAE Annual Meeting. One of these is a unique no-slip differential which will be manufactured and marketed by Warner Automotive Div. of Borg-Warner. Continental Motors showed discreetly a bright new OHV six-cylinder engine destined to power a new taxicab. And Schwitzer showed us a new thermostatically-controlled fan, using silicone fluid, in a large size groomed for heavy duty engines. Still another item was the 12-speed Synchro-Master transmission shown for the first time by Dana Corp.

Tuning Lines

Transfer machines, automation devices, assembly machines, and the other modern devices aimed at improved productivity have become exceedingly complex and require an extensive period of tuning to make them work. It is not a new phenomenon to find such equipment installed before the new models are announced and not working to full capacity for some months afterward. This is a price we pay for progress. Some years back when fewer major changes were made yearly this was not too much of a problem. At least the equipment for the previous model would be operating nicely by the time the next model year rolled around. Today things are different. Even while the new equipment for the current model is still being tuned. the planning department becomes busily engaged in expansion, new equipment programs, and new tooling for the next year's model. It results in an overlapping of effort that keeps all members of the organization humming.

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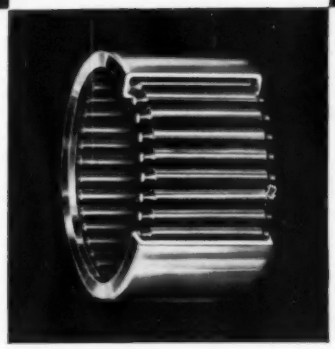

Many good turns a day!

Power steering has brought new ease and simplicity to driving. In power steering mechanisms, Torrington Needle Bearings have brought simplicity and economy of design, assembly and maintenance.

Especially preferred for this type of application, Needle Bearings offer unusual service dependability with a compactness unequaled by any other anti-friction bearing of comparable capacity. Compact in themselves, they also contribute to compact housing design and the use of larger, stronger shafts. They retain lubricant effectively, minimizing service requirements.

Such features have led to the use of Torrington Needle Bearings in a variety of automotive applications; transmissions, steering knuckles, brakes, clutches, hydraulic pumps and many others. For engineering assistance, talk to your Torrington representative. Catalog on request. THE TORRINGTON COMPANY, Torrington, Conn., South Bend 21, Ind.

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WEEKLY U.S. MOTOR VEHICLE PRODUCTION

As reported by the Automobile Manufacturers Association

	Weeks Ending		Year to Date	
	Jan. 18	Jan. 11	1958	1957
PASSENGER CAR PRODUCTION				
Rambler	3,698	3,824	9,031	*5,762
Total—American Motors Corp.	3,698	3,824	9,031	*5,762
Chrysler	1,834	1,953	4,685	8,299
De Soto	103	1,601	1,720	9,506
Dodge	889	3,571	5,039	16,277
Imperial	629	621	1,533	2,036
Plymouth	8,102	11,497	24,939	36,220
Total—Chrysler Corp.	11,557	19,243	37,916	72,338
Edsel	448	436	1,014	
Ford	26,901	27,844	65,024	92,179
Lincoln	824	98	1,429	3,638
Mercury	3,682	3,158	8,071	22,789
Total—Ford Motor Company	31,855	31,536	75,538	118,606
Buick	8,710	9,996	22,891	33,829
Cadillac	3,128	2,915	7,081	8,759
Chevrolet	33,812	33,839	81,969	89,406
Oldsmobile	9,680	9,579	23,157	27,237
Pontiac	7,322	8,052	18,762	24,097
Total—General Motors Corp.	62,652	64,381	153,860	183,328
Packard		187	187	879
Studebaker		970	970	3,001
Total—Studebaker-Packard Corp.		1,157	1,157	3,880
Checker Cab	80		80	169
Total—Passenger Cars	109,842	120,141	277,582	384,083

* Includes Hudson and Nash.

TRUCK AND BUS PRODUCTION				
Chevrolet	6,217	5,817	14,360	19,814
G. M. C.	1,252	1,273	3,048	4,266
Diamond T	116	110	261	208
Divco	60	60	144	206
Dodge and Fargo	799	1,290	2,089	4,330
Ford	5,670	4,911	12,927	9,623
F. W. D.	39	35	84	72
International	2,659	2,573	6,382	8,064
Mack	140	214	473	908
Studebaker		128	128	520
White	422	404	941	1,035
Willys	1,608	1,829	3,834	2,909
Other Trucks	60	60	150	243
Total—Trucks	19,042	18,704	44,821	52,198
Buses	80	70	189	180
Total—Motor Vehicles	128,964	138,915	322,592	436,461

RETAIL CAR SALES BY PRICE GROUPS*

NUMBER OF CARS

	November			
	1957		1956	
Price Group	Units†	% of Total	Units†	% of Total
Under $2,000	827	.21	13,514	3.42
$2,001 to $2,500	251,694	64.39	261,409	66.06
$2,501 to $3,500	103,374	26.45	100,641	25.44
Over $3,500	34,992	8.95	20,092	5.08
Total	390,887	100.00	395,656	100.00
	Eleven Months			
	1957		1956	
Price Group	Units†	% of Total	Units†	% of Total
Under $2,000	24,392	.46	844,995	15.77
$2,001 to $2,500	3,353,882	63.32	3,045,279	56.82
$2,501 to $3,500	1,494,628	28.21	1,249,539	23.32
Over $3,500	424,500	8.01	218,982	4.09
Total	5,297,402	100.00	5,358,795	100.00

DOLLAR VOLUME OF SALES

	November			
	1957		1956	
Price Group	Dollars	% of Total	Dollars	% of Total
Under $2,000	$ 1,295,909	.12	$ 26,324,980	2.78
$2,001 to $2,500	594,014,761	56.59	561,484,816	59.30
$2,501 to $3,500	297,968,269	28.38	277,806,453	29.34
Over $3,500	156,554,695	14.91	81,205,572	8.58
Total	$1,049,833,634	100.00	$ 946,821,821	100.00
	Eleven Months			
	1957		1956	
Price Group	Dollars	% of Total	Dollars	% of Tota
Under $2,000	$ 43,313,688	.31	$1,654,004,052	13.15
$2,001 to $2,500	7,568,810,378	54.43	6,549,303,728	52.09
$2,501 to $3,500	4,226,556,252	30.39	3,437,092,302	27.33
Over $3,500	2,067,507,194	14.87	934,060,624	7.43
Total	$13,906,187,512	100.00	$12,574,460,706	100.00

*—Calculated on basis of new car registrations, as reported by R. L. Polk & Co., in conjunction with advertised delivered price at factory of four-door sedan or equivalent model. Does not include transportation charges or extra equipment.

†—New registrations of American made cars only. Does not include imported foreign cars.

REGISTRATIONS OF FOREIGN CARS

First Eleven Months

1957		1956	
Volkswagen	57,700	Volkswagen	44,864
Renault	20,220	Metropolitan	6,515
British Ford	15,348	M. G.	5,153
M. G.	12,443	British Ford	3,690
Metropolitan	11,013	Jaguar	3,377
All Others	68,570	All Others	23,822
Total	185,294	Total	87,421

1957 NEW REGISTRATIONS

Based on data from R. L. Polk & Co.

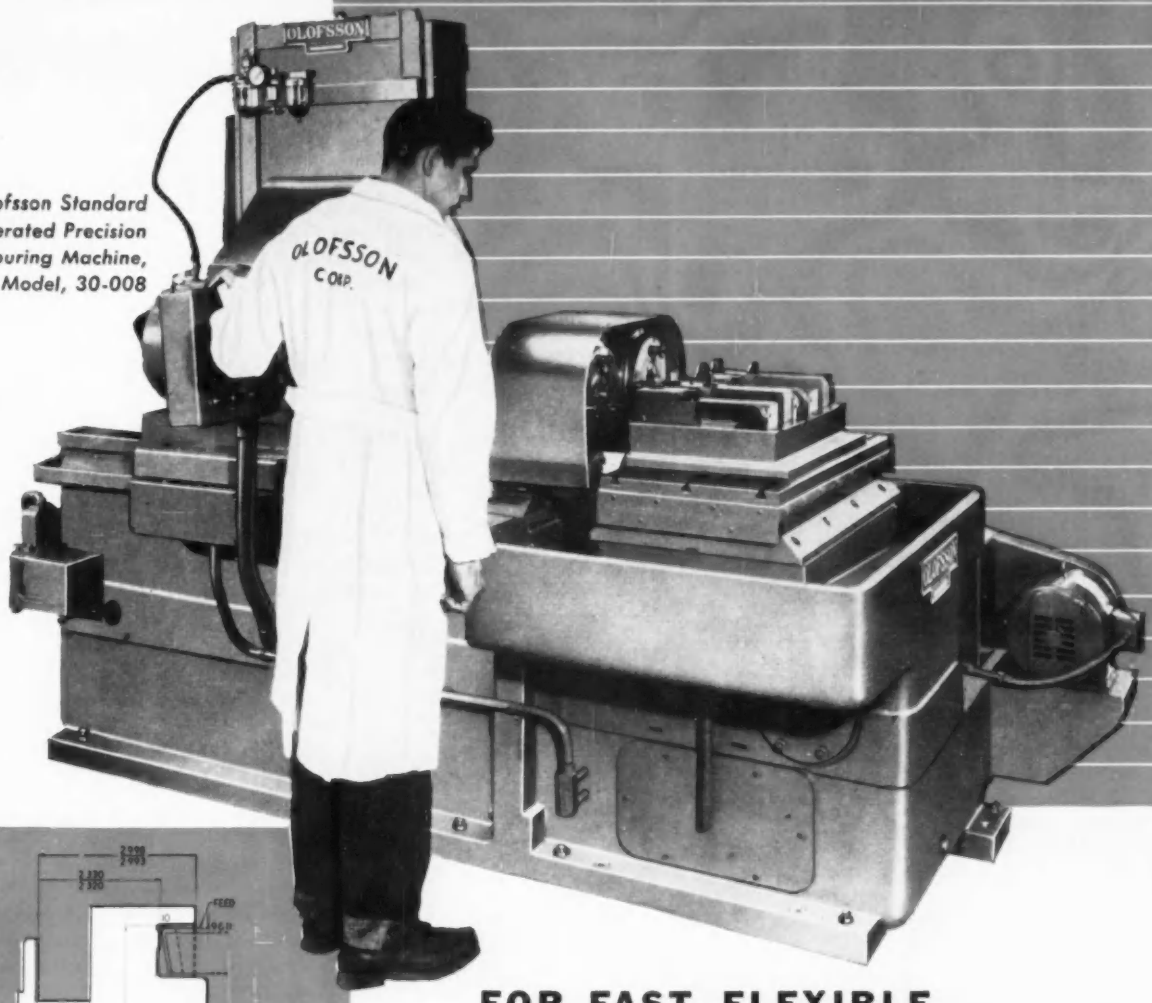
NEW PASSENGER CARS

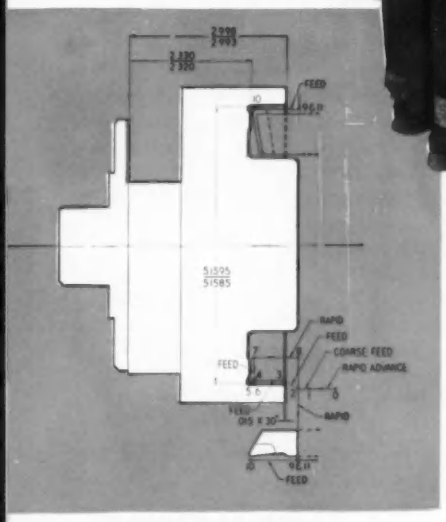
				ELEVEN MONTHS	
Make	November 1957	October 1957	November 1956	1957	1956
Ford	101,306	117,175	117,100	1,364,094	1,236,986
Chevrolet	104,165	114,223	112,619	1,316,502	1,436,288
Plymouth	35,819	42,655	34,579	558,533	440,107
Buick	26,423	24,384	24,364	358,428	489,266
Oldsmobile	24,315	24,622	21,628	335,522	403,176
Pontiac	19,953	24,053	21,833	293,743	330,708
Mercury	13,024	19,909	14,959	245,738	253,968
Dodge	16,631	20,467	15,722	241,962	200,523
Chrysler	9,198	10,572	6,023	129,370	107,258
Cadillac	9,175	10,579	3,624	127,910	121,096
De Soto	7,223	8,375	5,825	97,118	91,439
Rambler	8,565	7,539	5,359	82,202	65,294
Studebaker	4,872	4,951	4,527	58,071	70,695
Lincoln	2,323	2,602	2,963	32,232	39,363
Edsel	5,277	8,307		21,150	
Metropolitan	827	1,017	689	11,013	6,515
Nash	365	563	1,737	9,108	23,678
Packard	193	250	987	4,972	27,736
Hudson	134	175	719	4,433	11,069
Continental	817	20	84	1,434	1,415
Misc. Domestic	377	357	395	4,084	3,701
Foreign	17,550	21,000	8,192	174,281	80,906
Total—All Makes	408,534	463,795	403,948	5,471,900	5,441,187

NEW TRUCKS

				ELEVEN MONTHS	
Make	November 1957	October 1957	November 1956	1957	1956
Chevrolet	18,987	23,269	24,918	270,610	280,114
Ford	19,331	28,072	18,322	258,520	245,792
International	7,896	9,080	7,737	89,422	100,472
G. M. C.	4,661	5,105	5,784	57,689	76,255
Dodge	4,789	3,877	4,204	45,181	52,719
Willys Truck	1,310	1,377	1,220	13,854	12,625
Mack	958	1,265	870	12,290	12,089
White	737	1,047	1,080	11,776	14,158
Studebaker	403	440	448	6,139	8,106
Willys Jeep	574	643	866	6,010	8,181
Diamond T	261	327	253	3,160	3,704
Divco	169	231	209	2,433	2,946
Reo	119	140	208	1,945	2,785
Kenworth	46	76	46	962	1,177
Brockway	79	80	56	680	820
Peterbilt	35	38	32	471	571
F. W. D.	16	37	40	406	413
Misc. Domestic	60	84	120	791	1,132
Foreign	1,489	1,711	570	13,586	4,638
Total—All Makes	61,920	76,899	66,983	795,925	828,697

The Olofsson Standard Cam Operated Precision Contouring Machine, Model, 30-008





A TYPICAL APPLICATION
The part: transmission rear brake drum.
Material: pearlitic malleable iron.
Operations Performed: boring, facing, chamfering and undercutting.
Rate of Production: 70 pieces per hour.

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DIRECT CAM ACTION for mechanical control of precision tolerances gives the Olofsson Contouring Machine fast and accurate control over a wide variety of contouring operations.

Cams are easy to change. For more dependable operation they're mounted on a heavy duty spindle in the machine base.

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DESIGN FEATURES

- **Direct Cam Action**
- **Low height to width ratio of spindles to ways.**
- **Automatically lubricated, hardened and ground V and flat ways.**
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AUTOMATION NEWS REPORT

AUTOMATIC CONTROLS

PRODUCTION—VEHICLES—AIRCRAFT

By Samuel Cummings

FLEXIBLE AUTOMATION

Bendix Aviation Corp. has established a control section that will offer a new type of "flexible automation" to large companies as well as small tool and die shops. It will design and build completely automated systems, including associated electronic equipment and drives, to control machine tools in all cutting functions. Tape preparation and other engineering services will also be supplied to manufacturers and to the machine tool industry.

George S. Knopf, formerly executive engineer of the Bendix Research Laboratories, has been named manager of the new facility, which will be located in Detroit, Mich.

ATLAS GUIDANCE SYSTEM

Burroughs Corp. has disclosed that it was the builder of the electronic guidance computer used in the Atlas ICBM test program at Cape Canaveral, Fla.

The guidance system, successfully used in the recent Atlas launching, is a prototype of production models which Burroughs will build in a Detroit plant for the Air Force.

Burroughs officials said that the Atlas computer system handles missile flight problems in much the same way they are handled by computers in business and scientific applications.

Before the missile is launched, information concerning the planned trajectory is put into the computer. During the initial stages of the missile's flight, a constant stream of data on the missile's course, speed, and altitude is fed automatically to the computer.

The computer compares this data with previously programmed information and sends the necessary instructions to the missile to keep it on the correct course to the target.

RESEARCH TOOL

A new research tool called the Electron Probe Microanalyzer (see illustration) is now being used at the California Institute of Technology to supplement fluorescence x-ray analysis in the solution of metallurgical problems.

The new device consists of an electron probe, which bombards the surface of a specimen with electrons; an optical system for finding the probe's impact point; and an x-ray spectrometer, which measures the intensities and wavelengths of those x-rays that are characteristic of the elements contained in the target.

The instrument works best with metals that are good conductors of heat and electricity, but it can be used on slags, metallic oxides, sulfides, and minerals when their surfaces are coated with thin layers of metal to prevent charging and overheating of the specimen under the action of the electron beam.

The Caltech Microanalyzer is currently being used to study the diffusion of germanium in silicon, as well as to measure the surface concentration and depth of diffusion of chromium in chromized iron.

A number of manufacturers are reported to be looking into the potential applications of this laboratory instrument, with the idea of producing commercial models that could be used for routine anaylsis and quality control, as well as metallurgical research.

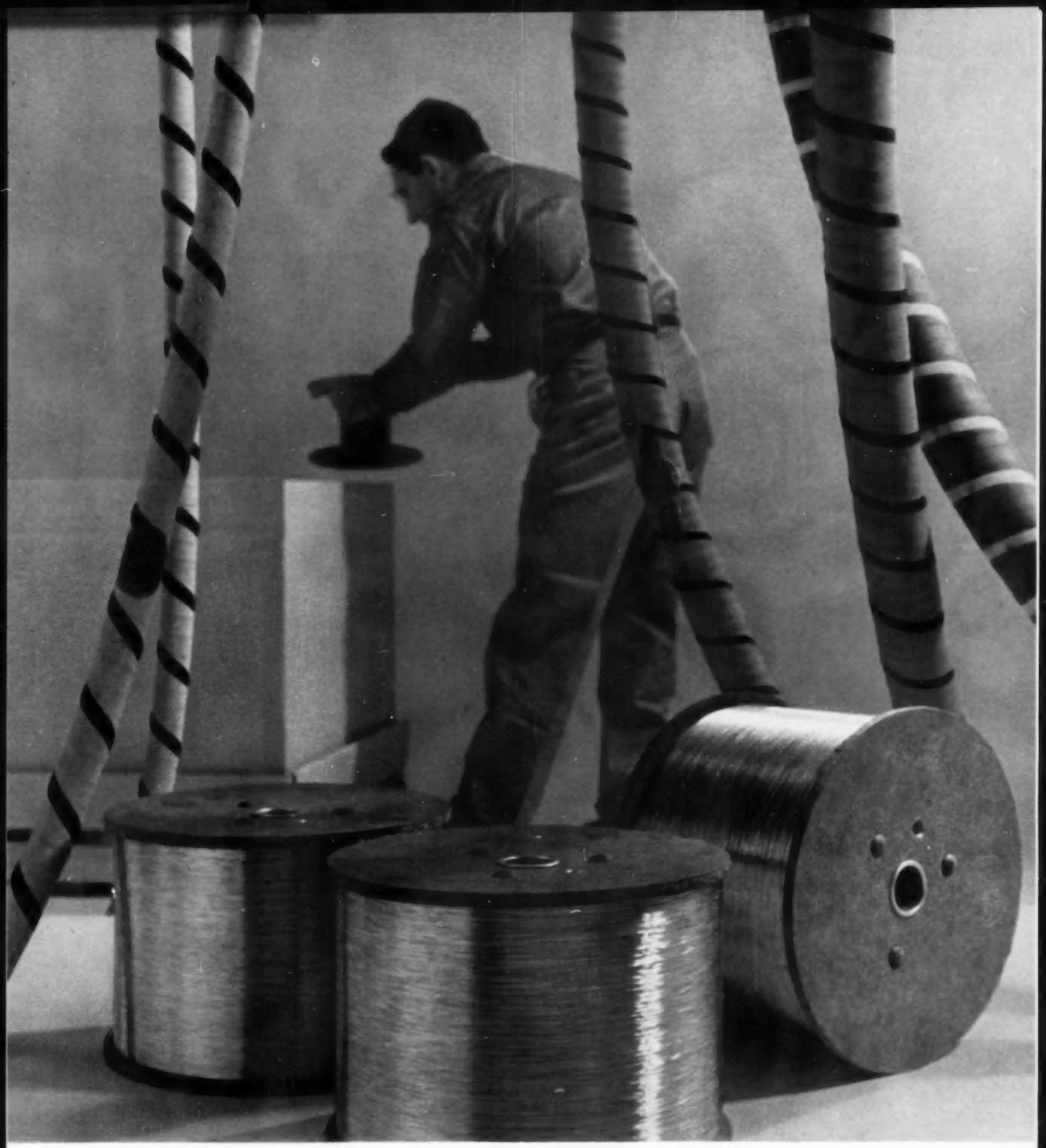
USE OF AUTOMATIC CONTROLS WIDENED

U. S. industry widened its use of automatic controls in 1957 to further improve production techniques, according to Henry F. Dever, vice-president of Minneapolis-Honeywell's Industrial Products Group.

"The compelling need of industry to offset costs that are rising faster than gains in productivity, and the intricate nature of many of today's manufacturing operations, stimulated interest in all forms of instrumentation," he said in a year-end report.

Although sales of automatic controls last year were the largest in the industry's history, Dever expects that the present decline in economic activity will have an adverse effect on sales well into 1958. Nevertheless, the future of the industry looks as bright as ever, Dever pointed out, since only about 10 to 15 per cent of the industry's potential has been realized.

Caltech Microanalyzer is research tool for the metallurgist



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The best things come in no-charge packages

When you buy Roebling Hose Reinforcing Wire it is delivered to you on no-charge spools that mean savings to you.

This modern method of packaging does away completely with deposits and the bookkeeping involved; it contributes, too, to lower freight costs. Thus, you avail yourself of a precision-made and quality controlled product, without any handling, shipping and inventory inconveniences.

Roebling Hose Reinforcing Wire, used for braiding reinforcement, is produced in a complete range of sizes. Write Wire and Cold Rolled Steel Products Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

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We took a tip from a typist

The question came up at a Heads-of-Departments meeting. Production told Personnel that his new typist asked that a portion of her salary be set aside for U. S. Savings Bonds. Could it be arranged?

This one question posed another: How many more employees, like the typist, would like to buy Savings Bonds automatically through Payroll Savings, yet, were not aware that we've had a Plan for years?

Finding out was simple.

A phone call brought the assistance of our State Savings Bond Director. He helped plan a company-wide campaign, and provided all the materials to inform our people about the advantages of U. S. Savings Bonds. Everyone received an application card.

The upshot? Employee participation shot up to the highest percentage since the mid-Forties. And the whole program was conducted in good order. Work was never interrupted.

Today there are more Payroll savers than ever before in peace time. Look up your State Director in the phone book or write: Savings Bonds Division, U. S. Treasury Dept., Washington, D. C.

AUTOMOTIVE INDUSTRIES

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News of the
MACHINERY INDUSTRIES

(*Continued from page 79*)

tubing. In addition to added output, it is said to give the required spheroidized structure and hardness and a minimum of decarburization on both the inside and outside surfaces.

Before making the installation the company explored various methods for meeting market needs for quantity production of these grades of high-quality tubing. Conventional means were considered to be lacking in either production potential or product uniformity. While the advantages of uniformity of heating in a roller hearth furnace were recognized, the usual method had shortcomings when cycle-annealing the higher carbon grades of alloy steel (which require an extended-cycle anneal to produce a spheroidized structure) because furnace capacity is limited by its physical size.

These production limitations, Ohio Seamless decided, could be overcome by a controlled-atmosphere roller-hearth furnace which permitted the loading of three or more layers of tubing to a height of 16 in., with spacer bars separating the layers, to a loading of 2000 lb per foot length of furnace.

The furnace is now in use and has an hourly capacity of three or more times that of conventional furnaces with single layer loading. According to Ohio Seamless, the structures and hardnesses throughout a charge are uniform and well within acceptable limits of specifications, and decarburization of surfaces is at a minimum.

Several novel furnace features are claimed. Essentially, the unit consists of a furnace chamber 70 ft long and 8 ft wide, with an effective loading width of 7 ft. Vestibules are provided at both entry and discharge ends, each provided with gas-tight doors between vestibules and the furnace proper, as well as at the ends of the vestibules. Overall length is 115 ft.

The furnace is divided into five temperature control zones. The first two zones are heated by U-tubes arranged over and under the rollers; the last three zones have the same type radiant tubes under the charge only. Total heat input is 5,000,000 Btu/hr. Cold air can be circulated through the tubes to control rate of cooling, as desired.

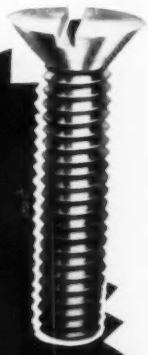
A system of automatic signals and interlocks prevents the outer vestibule doors from being opened until the furnace doors are closed. A variable speed drive provides a speed range of 1½ to 11 fph. Separate high-speed drives are provided at each end so that the charge can enter or discharge from the vestibules at 20 fpm. The variable speed drive conveys the charge rapidly from the entry vestibule to the furnace and then slows down to cycle speed. The load can be discharged at high speed, or can be held in the discharge vestibule for additional slow cooling time.

The atmosphere used is dried nitrogen which can be enriched with natural gas if re-carburization is called for.

Although the primary function of the furnace is to obtain the required spheroidized structure and hardness, the furnace was designed and constructed so that full anneal structures and hardness could be obtained, which necessarily requires heating above the upper critical point with the required slow cool to meet the requirements of a specification.

A long-term financing plan for the purchase of machine tools was recently announced in a joint statement by Ralph S. Howe, president of the New Britain Machine Co., and E. T. Neville, vice president of C. I. T. Corp. Terms to 10 years and down payment requirements as low as 10 per cent are features of the plan.

PHILLIPS OR SLOTTED
MACHINE SCREWS
BY Southern



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Wire, phone, or write Southern Screw Company, Statesville, North Carolina, for immediate handling of your order or inquiry.

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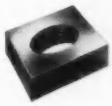

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*WAREHOUSES: NEW YORK, CHICAGO, DALLAS, LOS ANGELES

Southern SCREW COMPANY
STATESVILLE • NORTH CAROLINA

20 Different Stampings Replaced by 2 Two-Piece Weldments

By

J. Howard Stoops

Manufacturing Manager

Huppower Division, Hupp Corp.

MANY modern cars having different door and body shapes are equipped with electrically operated window regulators built in large volume by Huppower Division of Hupp Corp., Detroit. Such regulators have the motor and worm gear reduction mounted on a stamped plate that is fastened to an inner panel and is positioned between this panel and the door or body outer shell.

Until recently, Huppower had to make 20 different stamped mounting plates because each car maker specified one or more different mountings to adapt the regulator to different doors on various body or car models. This required as many different dies as there were different plates and, of course, each such die was expensive and required a new press set up for each lot produced.

Study of the different designs showed that the chief and significant difference (except for rights and lefts always needed) was in the angle at which the motor and worm reducer were mounted. So Huppower engineers designed a two-piece mounting that has a plate adaptable to almost any car or door and a second stamping to hold the motor and reducer. This second stamping can be set at almost any angle, and, when so set, is easily and quickly projection welded to the plate.

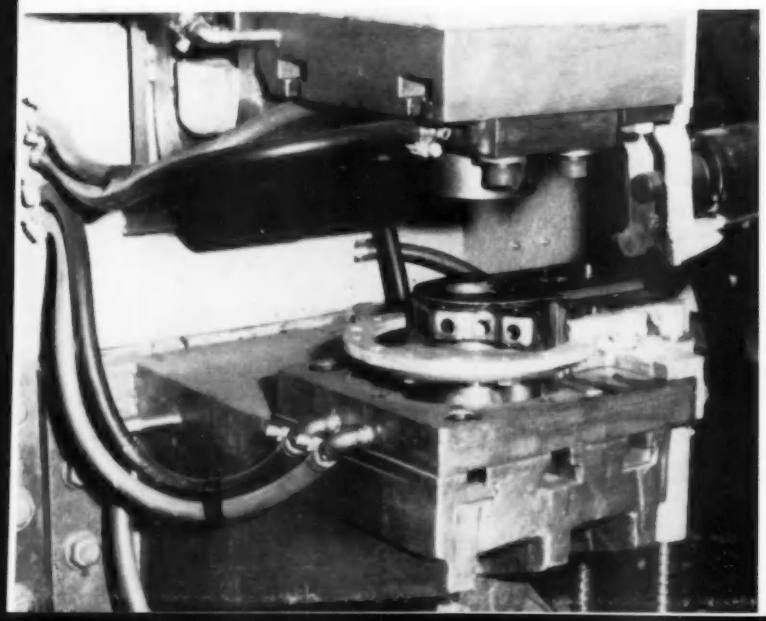
Accordingly, the assembly, whose components are made in two pairs of dies of moderate cost (one pair rights and one lefts) can take the place of any 20 different stampings required before. A welding operation, not needed before, is required but its cost is low and is much more than offset by die and setup savings, space for extra equipment, stock, etc.

Any of the two-piece right or left assemblies can be made in the Federal projection welder setup here illustrated, as the welding die includes a fixed horizontal position for the plate stamping and adjustable portion that can be set anywhere along an arc of 185 deg about a vertical axis. This portion is set, of course, to locate the upper stamping where specified for the particular weldment to be produced.

In making the upper stamping, it is given five projections spaced equally around a circle and, in the setup illustrated, all of the projections come below the tubular upper electrode, no matter what angular setting is given to the upper stamping. As the lower stamping rests on the lower electrode, the two stampings are joined at the five projections when the welder closes.

Loading of the welder is done by hand, the upper plate being located by the die in the required angular position. As soon as the weld is made and the die opens, a solenoid at the right is actuated automatically and a kickout ejects the weldment into a chute (not shown in the illustration) at the opposite side of the die. Then the weldment is advanced along a bench where it is assembled to other parts, including the motor and gearing that the upper stamping holds in specified position.

Direct savings attained by the weldment are considerable but others result from simplifying the stocking and handling of parts and tend to reduce other shop operations as well as the space they required before.



Setup in the Federal projection welder used by Huppower Division to make weldments in which the angular position of the upper stamping relative to the lower one can be set to meet different customer requirements.

Eaton Valves are Solving Problems Like These—

1. Broken valve due to overstressing.

2. Corrosion and cracking of the valve face caused by leakage.

3. Corrosion of the valve face due to sticking caused by stem and guide deposits.

4. Actual melting of valve material due to extremely high temperatures caused by preignition.

If you are having valve troubles, why not discuss them with Eaton Valve Division engineers. They will be glad to work with you in diagnosing the causes of failure, and in developing valves to meet the particular requirements of your engines and the kind of operation in which they are used. In hundreds of cases, Eaton engineers have been successful in suggesting measures which have corrected the most stubborn valve train problems. A study of your problem with complete technical report involves no obligation. Write, wire, or phone.

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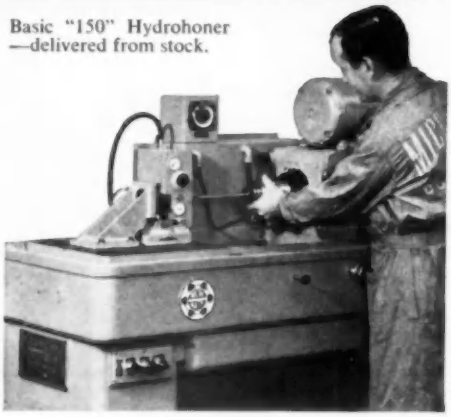
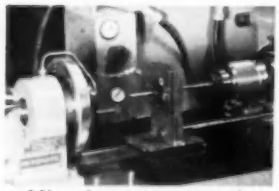
WHY "150" HYDROHONER

Reduces Costs . . .
Assures Controlled Finish . . .
Provides Rapid Stock Removal

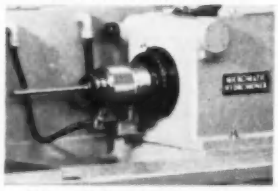
To assure rapid stock removal and consistent generation of surface finish desired, the low-cost "150" Hydrohoner utilizes the distinctive Microhoning characteristic of self-dressing abrasives. Because abrasive grits are kept sharp-cutting at all times by a combination of controlled pressure and reciprocating-revolving motions of tool, a constantly high cutting efficiency is effected.

Basic "150" Hydrohoner —delivered from stock.





Microsize gage automatically ends cycle when exact size is reached.



Microdial automatic feed control and stone wear compensation.

Possessing a 12-inch stroke and a work diameter capacity of 1½ inches, the standardized "150" readily accommodates a variety of fixturing and tooling to assure easy adaption to a wide variety of work parts. Also, by addition of standard packaged units produced by Micromatic, it can be partially or fully automated.

Performing to the standards of higher-priced, special-purpose honing machines and incorporating features of a general-purpose design, the "150" Hydrohoner is an economical, long-range investment for long or short production runs.

Send Coupon for Complete Information.

Learn why Microhoning will give efficient stock removal, closer tolerances, accurate alignment and functional surfaces.

☐ Please have a Micromatic Field Engineer call.
☐ Please send Micromatic literature and case histories.

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MICROMATIC HONE CORP.
8100 SCHOOLCRAFT AVENUE · DETROIT 38, MICHIGAN

Report from the FARM EQUIPMENT INDUSTRY

(*Continued from page* 69)

more than 5600 sq in. of separating area, and more than 4000 sq in. of cleaning area. Motive power is a new 80 hp John Deere engine. Large tires are provided for good traction and flotation.

The new combine will be available for the 1958 harvest season, the company announces.

Case Farm Tractors

THE J. I. CASE CO., Racine, Wisc., has announced its new line of farm tractors, three of which are equipped with a combination torque converter and a standard multiple-geared transmission, offered under the trade designation Case-o-matic. This is the first automatic torque converter offered on a farm tractor, though other lines have used hydraulic couplings, and construction equipment has used the torque converter for several years. This Case unit combines a torque converter with a standard gear transmission in three of the tractors of the new line.

The Case line, newly restyled, includes 124 models in 12 power classes, and in both wheeled and crawler types. Two of the crawler tractors use the Terramatic drive.

Cash Receipts Up

CASH RECEIPTS of farmers for the month of October, as compiled by the Department of Agriculture, were $3,500,000,000. This figure, up more than $500 million from the preceding month, represents payments to farmers for crops moving to market at or near the end of the harvest season, and higher cash receipts for meat animals going to market. The index of prices received by farmers, also from the Department of Agriculture, was 242 for the month ending Nov. 15, 1957, as compared with 240 for the preceding month, and 234 for the month ending Nov. 15, 1956.

AUTOMOTIVE INDUSTRIES KEEPS YOU INFORMED

New Equipment at AC SPARK PLUG PLANT

(*Continued from page* 57)

tion ahead of the assembly conveyor, has an extruded annulus of blue Plastisol formulation on its inner surface. The elements move on the conveyor into a curing oven, where the Plastisol material is softened and cured to one side of the element, penetrating the paper to a depth of approximately 1/16 in.

As the elements leave the first curing oven they are removed from the mold and turned over to present the opposite side to another mold. Then they go through the second curing oven. At the end of the cycle both ends of the element have been sealed with the protective and decorative plastic coating.

Another of the illustrations shows views of the compact assembly machine for producing breather assemblies. It has a 44-station conveyor that carries the work around the various operator-manned stations.

Semi-Automatic Machine

(*Continued from page* 62)

The chain and sprocket now are assembled manually and other details are completed. At this point the line has been fitted with a Wilson Automation cross-over conveyor unit to provide clearance for a wide aisle. Blocks are automatically lifted up, then over, and down to the Natco machine.

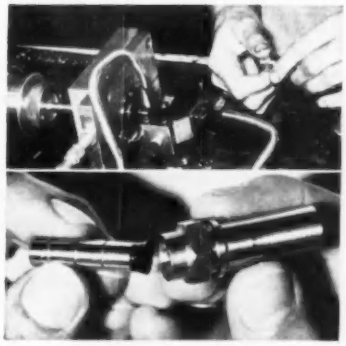
Another noteworthy operation takes place next. First of all, there is a station that positions the crankshaft for the assembly of a bank of four piston and connecting rod assemblies and sprays with oil. Then the block enters an A. E. Parker semi-automatic station. Part of the assembly is done manually. An operator takes the rod assemblies from the carrier, installs the bolt protector and alignment fixture and pushes the assemblies partly in place. Then the operator

HOW Manufacturers Use "150" HYDROHONER To Reduce Costs...Control Finish... Obtain Rapid Stock Removal

Leading Manufacturers of precision parts are using the low-cost "150" Hydrohoner to secure high production, rapid stock removal, geometrical precision and controlled surface finishes. Indicative of the versatility for application of this highly efficient honing machine are the following recent installations:

The crankpin bore of a compressor connecting rod is Microhoned on a "150" Hydrohoner within tolerances of .00015" for taper, and .0002" for size and out-of-roundness. From .0008" to .001" of stock is removed from the bore (.875" diameter x .43" long) in about 8 seconds, while obtaining an 8 Microinch finish.

In this installation, a "150" is Microhoning in two runs the bore (.313" diameter x 1.375" long) of a braking cylinder. The first run removes between .004" and .006" of stock in 30 to 35 seconds. During finishing run, the final .0005" to .0008" is removed to provide geometric accuracy within .0002" tolerance and an 8 Microinch or better finish. Precision and controlled finish of bore prevent hydraulic oil leakage and minimize wear of neoprene-cupped piston.



The principles and application of Microhoning are explained in a 30-minute, 16mm, sound movie, "Progress in Precision" . . . available at your request.

☐ Please send me "Progress in Precision" in time for showing on_____(date).
☐ Please have a Micromatic Field Engineer call.
☐ Please send Microhoning literature and case histories.

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8100 SCHOOLCRAFT AVENUE • DETROIT 38, MICHIGAN

O-M ...a Power-Full Idea in High Pressure Hydraulic Cylinders

Tested, tried and proved powerful components in today's fast-moving automation picture, these ruggedly constructed O-M Heavy-duty Hydraulic Cylinders breeze through heavy work loads, withstand shocks and strains, and provide smooth dependable power for a wide range of pressures and operating conditions.

Important design and construction features:

1. Head Seal—"O" Ring with leather back-up washer assures positive seal between head and tube.

2. Heads confine tubing O.D. to prevent breathing and thereby provide additional insurance against leakage under the most severe conditions.

3. Heads are counterbored to pilot in accurately honed tubing to assure perfect alignment.

4. Multiple lip, self-compensating, Vee type rod gland packing.

5. Step-cut ring type pistons are standard, but Vee type pistons are available for holding application.

6. Rod-gland cartridge is removable for easy maintenance.

O-M Series TH High Pressure Hydraulic (oil) Cylinders are available in full range of sizes (1½" to 8" bores) with standard and heavy duty piston rods.

Mail coupon TODAY for Bulletin 105 showing descriptive drawings of cylinders, mounting accessories and capacity chart.

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17 143rd Street, Hammond, Indiana
☐ Have representative call
☐ Send Bulletin 105

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removes the alignment fixture, and the automatic assembly machine comes into play to press the assemblies in place under controlled hydraulic pressure to prevent seizure.

The operator manually assembles the connecting rod bearing caps. The blocks then enter an Ingersoll-Rand automatic nut runner that assembles and tightens the eight connecting rod nuts.

The preceding operations are repeated again on the line to complete the installation of the eight rod assemblies and the make-up of all rod bearing-cap fastenings.

As the blocks come out of the second Ingersoll-Rand nut runner, they enter a special pallet conveyor system supplied by Planet Corp. This conveyor provides space for inspection and repair operations. The last station is an automatic roll-over in which the block is rotated twice to remove any foreign material that may have fallen into the engine during assembly operations. Then the block moves automatically on the transfer conveyor to the end of the line to the engine storage sections which serve as a bank for the final engine assembly line.

Meanwhile, the flow of engine sub-assemblies continues to the end of the line where each one is picked up automatically by the Jervis B. Webb conveyor, using a solid horseshoe type carrier. These assemblies are transported continuously to the final engine assembly line where engines are mounted on pedestal-type fixtures for completion and dress-up.

• • •

Plymouth Adds Station Wagon; Line Nows Totals 14 Models

Plymouth has added a station wagon to its 1958 line, bringing to 14 the number of Plymouth wagons available this year.

The new station wagon six-passenger DeLuxe Suburban—is a four-door model built on a 122-in. wheelbase with a 10-ft cargo deck and nearly 100 cu ft of storage space.

The PowerFlow 6 model carries a factory retail price (at Detroit) of $2,268, exclusive of Federal excise, state and local taxes and handling and delivery charges. Equipped with the Fury V-800 engine, its factory retail price is $100 higher.

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1958
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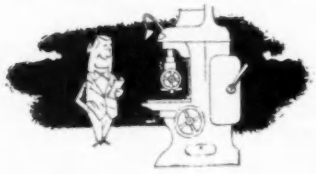
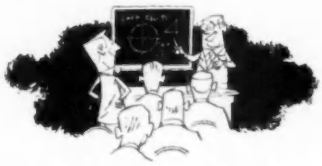
SEE all the very latest advances and improvements in more than thirty major categories of industrial products.



ATTEND top-level conferences, conducted by recognized authorities on the newest production techniques and developments.



MEET and exchange ideas with management, engineering, production, sales people from the nation's leading industrial concerns.

INSPECT the modern equipment and up-to-the minute manufacturing methods being utilized in booming Delaware Valley plants.

AMERICAN SOCIETY
TOOL SHOW CONFERENCE '58 MAY 1 TO 8
OF TOOL ENGINEERS

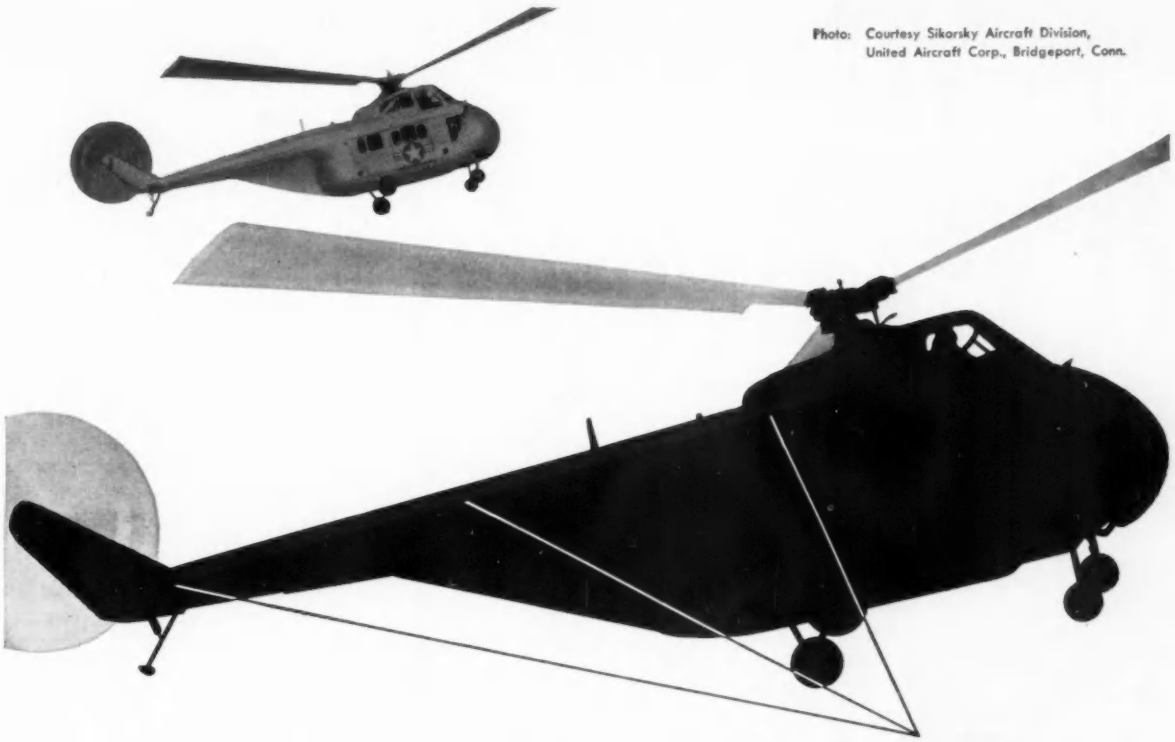


Photo: Courtesy Sikorsky Aircraft Division, United Aircraft Corp., Bridgeport, Conn.

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Strength, lightness, concentricity, *highest metallurgical quality* — just some of the rigid requirements set up by Sikorsky for seamless steel tubing used in tail rotor drive shafts for S-55 Marine helicopters. Sikorsky engineers demanded a tube with special O.D. and wall tolerances, special straightness and suitable for 100% Magnaflux inspection to Sikorsky's own stringent specifications.

Ohio Seamless engineers and metallurgists tackled the problem and met these rigid mechanical and magnetic quality standards — with "Ohio Special Quality" tubing.

Even if you don't make helicopter components, this actual case history may trigger your imagination. We'd like to tell you more about Ostuco Tubing. Just contact our nearest sales office, or the plant at *Shelby, Ohio — Birthplace of the Seamless Steel Tube Industry in America.*

Navy and Army, too. Ohio Special Quality tubing is also used in Sikorsky S-55's adapted for the specialized needs of the Navy, Army and allied nations.

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OHIO SEAMLESS TUBE DIVISION

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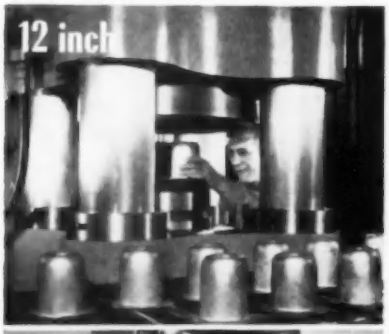
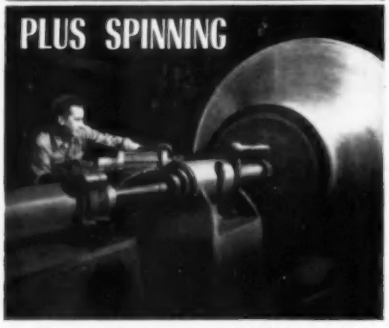
Seamless and Electric Resistance Welded Steel Tubing • Fabricating and Forging

AA-6529

HYDROFORM JOB SHOP





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ENGINEERING REPRESENTATIVES IN PRINCIPAL CITIES

Fully Automatic 1000-Hp Dynamometer Tests Power Transmission Equipment

(*Continued from page* 63)

absorb 17,500 lb-ft of torque at 75 rpm and 20,000 lb-ft of torque at full stall (zero rpm) with a top input speed of 3000 rpm.

The squirrel-cage induction motor is operated on 2300 volts by a blower-cooled Allis-Chalmers transformer. Both motor and transformer are equipped with hot-spot indicators and automatic unloading controls.

The Dynamatic eddy current clutch brake unit may be set to deliver from 15 rpm to 1800 rpm, with all speeds controlled to ½ per cent.

The unique clutch brake unit may be set to deliver a constant and controlled speed or it may be set to deliver a constant torque regardless of speed demanded by the unit on test. The clutch is supplemented by a brake so that rapid changes can be immediately controlled by the operator.

In order to obtain at least 1000 hp throughout the useful speed range of the machine, a special transmission is used. It delivers speed ratios of 1:1, 1.8096:1 in multiplying series, and 1.3448:1 in dividing series. The gear box is arranged so that it can be easily turned end for end. When this is done the transmission becomes a speed reducer having ratios of 1:1.3448 and 1:1.8096, thereby providing the required five speed ratios.

The gear box supplies input to the B-L-H torquemeter. The torquemeter measures the input torque supplied to the unit on test.

Input torque is shown on a manually balanced B-L-H torque indicator mounted on the central control panel and the torque signal and speed signal can be fed into a B-L-H xy-function plotter also mounted on the panel.

The function plotter automatically plots input torque versus input speed or input torque versus speed ratio, according to the choice of the operator. The plotter will record the full scale from 500 lb-ft to 20,000 lb-ft of input torque.

The absorption end of the machine is instrumented to show speed and output torque. Output torque is measured by a B-L-H 10,000-lb capacity SR-4 load cell.

The output torque signal from the load cell is fed to a separate function plotter on the control panel which automatically plots output torque against speed or speed ratio. Both input and output function plotters are accurate to within plus or minus ½ per cent on both axes.

Service stop and emergency stop controls on the console panel and at six other convenient locations around the dynamometer room allow the motor to be taken off the line and full braking torque to be applied if trouble develops. The entire machine can be brought to a full stop from 3000 rpm in just two seconds.

SHORTIES

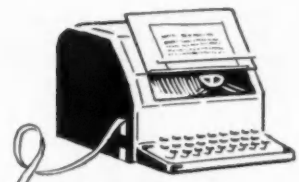
To provide new test installations and plant expansions for the ballistic missile program (ICBM and IRBM), more than $470 million has been invested in the past three years. The aircraft industry has provided more than $100 million of this total from its earnings to speed this high priority national defense program, even though there are no commercial applications for ballistic missiles.

●

The recreational boating industry of the U. S. exported $14,499,434 worth of pleasure craft and outboard motors during 1956. Meanwhile, 9263 foreign-built recreational craft valued at $4,807,232 were imported in 1956.

●

Six out of ten of the more than 60,000 civilian planes in the U. S. are privately owned, personal aircraft.



ON OUR WASHINGTON WIRE

Conventional armament and equipment must continue to play an important — although somewhat smaller — role in national defense, Mr. Eisenhower warns. Despite advances in space travel, atomic weapons, and intercontinental missiles, the Pentagon is still ordering sizeable quantities of propeller-driven aircraft, rifles and small-arms ammunition, and land vehicles of many types.

There is one small ray of hope in the tax picture: Mr. Eisenhower discloses that he will send to Congress new recommendations for "technical revisions" in the tax laws applying to small business. The changes, if enacted, will give, he says, "substantial benefits to business with a minimum loss of revenue, and with no change in rates."

Stockpiling of metal minerals is to decline still further, if Congress buys Mr. Eisenhower's recommendations. The new appropriation asked for stockpiling is $422 million, down from this year's $565 million.

Here's how Government buying of defense items will rise this year: In 1957, total spending for military hardware was $12.1 billion. This year: $17.3 billion, up by $5.2 billion. More than half will be spent in the first six months.

Labor, particularly the automobile workers, hold the key to the business recovery expected in mid-1958, top Eisenhower officials say. Labor wage settlements this year which exceed productivity increases could block the business recovery. But, price increases by industry, which are unwarranted by cost increase, could also have the same effect of "aborting the upturn," these economists warn.

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Never before has there been a tool like the SCHRILLO SINGLE-LIPPED COUNTERSINK. Its smooth chatterless operation in even the toughest alloy steels makes it indispensable for efficient countersinking and external deburring applications. The cutting edge and rigid radial relief control are correctly designed for fast, clean cutting.

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3112	3/8"	¼"	$2.40
3116	½"	¼"	$2.95
3120	5/8"	¼"	$3.85
3124	¾"	¼"	$4.35
3128	7/8"	¼"	$5.25
3132	1"	¼"	$6.35

(When ordering, specify angulation.)

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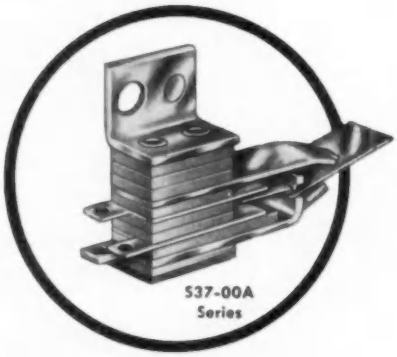

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Automotive Industries

A Chilton Publication

Chestnut & 56th Sts. Philadelphia 39, Pa.

Special Machine

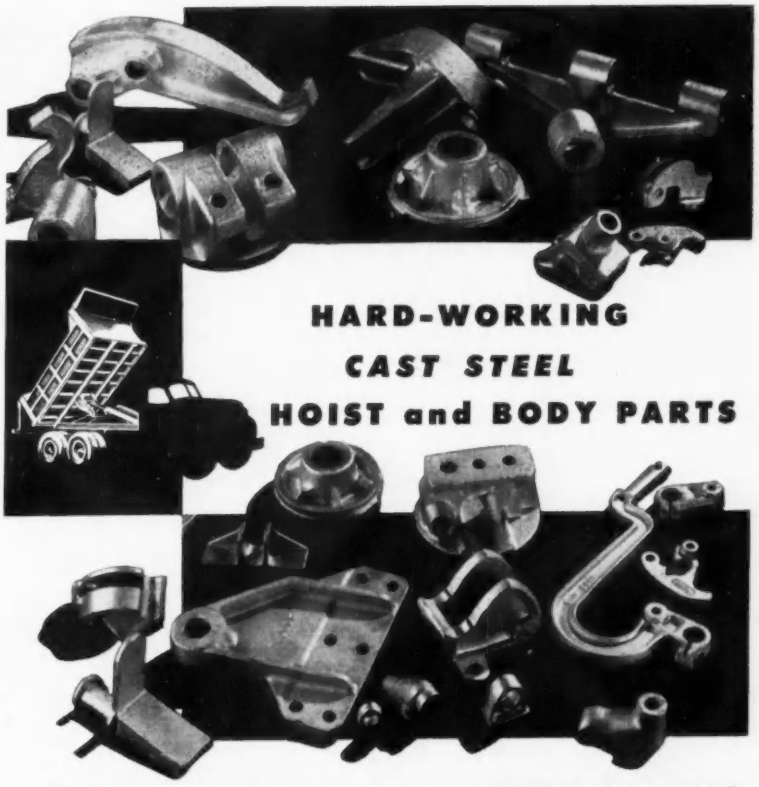
(*Continued from page* 59)

Looking over the table it will be apparent that the construction of this type of equipment requires a great deal of stainless steel of several types. To this must be added the stainless steel consumed in making the elaborate system of ducting for exhausting the noxious vapors generated in the various chemical baths. The latter system is of downdraft type with the main duct extending over the length of the machine. The system is characterized as being of push-and-pull type, operated by air turbines, in the gallery. The ventilating and exhaust system is so effective that no chemical odors can be detected even when on the cat-walk around the machine.

Generally speaking, tanks 1, 2, 4, 21 and 24 are held at a temperature ranging from 140 to 180 F; while tanks 10, 27 and 30 are maintained at 208 to 210 F. With the exception of tanks 1, 2, 31 and 32, all of the tanks in the system are provided with air agitation. The bright dip tank (10) on the other hand, requires mechanical agitation as well in order to keep the high viscosity chemicals intimately mixed in the solution.

It may be of interest to note that the designed gross load per carrier is 120 lb; and current density 700 amp at 17 volts for each carrier.

Another element of interest is the simple procedure devised for inspecting the quality of the coating. First of all, the depth of anodizing is held at 0.00020 in. minimum. If this depth of penetration is maintained, the surface is a dielectric. One of the illustrations shows the inspection conveyor arranged to one side of the machine. As grilles are unloaded from the racks, they are placed on the conveyor and in their movement pass under a group of brushes, two of which contact each piece to provide a current path. If the coating is of standard thickness no current will pass through the part. However, if there is no coating or if the coating is deficient current will flow and actuate a tell-tale light to indicate cause for rejection.



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"Foundry Engineered" Unitcastings meet the dimensional accuracy, internal soundness, good surface appearance and other requirements specified by the customer. In addition, Unitcast's modern steel casting methods and facilities make possible the *consistent uniformity* that means a *lower end cost!*

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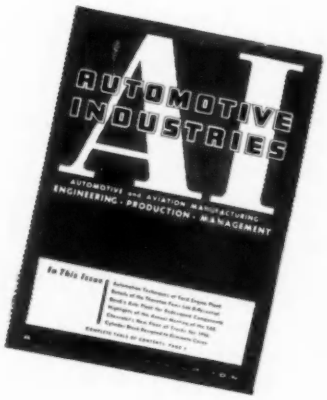
Because it is the only news magazine which is geared to the expanding needs of the 3660 concerns manufacturing cars, trucks, buses, aircraft, engines, parts, and powered agricultural, construction and materials handling equipment. It brings the latest authoritative design and production news to the men who make the major buying decisions in this $15 billion market. And equal in importance to them is A.I.'s advertising content. Your sales messages should be in every issue.



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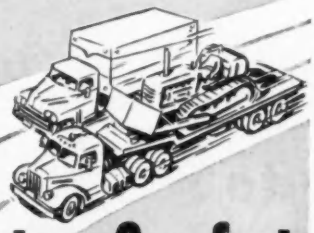

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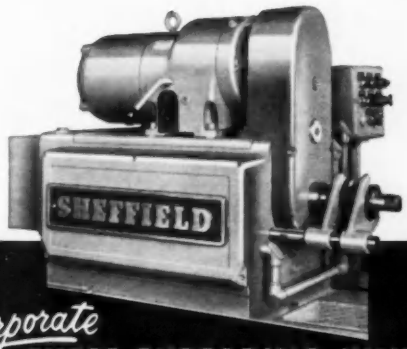

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It cuts internal or external threads and also can be arranged for boring, reaming, chamfering and facing.

The Precision-Pak can be mounted in any position—at any angle.

CAPACITIES:
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Maximum Pitch.....8
Maximum Length Thread.....4"

For detailed information write to the Sheffield Corporation, Dayton 1, Ohio, U.S.A., Dept. "4"

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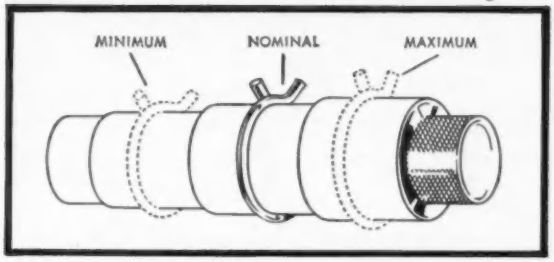
Constant Concentricity



Insures Constant Clamping

CORBIN Self-Tightening Hose Clamps are designed to maintain perfect-circle concentricity and constant clamping pressure on every application, regardless of service expansions or contractions of the hose. That's why CORBIN Hose Clamps never need adjustment . . . positively prevent leaks and shortened hose life caused by "pinching" clamps on oversize new hose, or service-shrunk connections.

Available in sizes ⅜" to 2⅝". Immediate delivery. Safe, simple to install. CORBIN Self-Tightening Hose Clamps are used by virtually every automotive and appliance manufacturer in the U.S.A. Write for *new* Service and Engineering Bulletin #HC18. Corbin Hose Clamp Division, The American Hardware Corporation.

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NEW BRITAIN, CONNECTICUT

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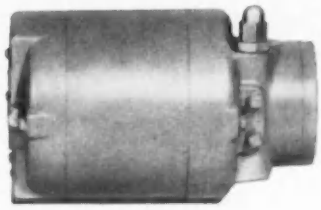
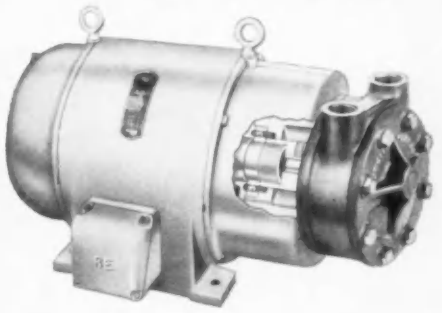


1

2

3 NEW TUTHILL close coupled pump and motor units



3

Save space, Save weight, Cut costs

Now TUTHILL offers three pump and motor combinations developed specifically for applications where space or weight are at a premium. Furnished in a wide variety of sizes and styles, one of these combinations can provide savings in hydraulic, oil burning, lubrication or other services.

The small size of these combinations solves design problems. By reducing weight they cut shipping charges. The elimination of couplings, adapters and bases means lower costs. And even more important savings are often made through the simplification of installation procedures.

Available from Stock

A wide variety of combinations are available immediately from stock, in either large or small quantities.

For example, Number 1 above is TUTHILL'S famous POWERMITE—a combination in which pump and motor are incorporated in one unit which takes up no more space than a standard electric motor (the POWERMITE shown measures only 3⅞" x 7½").

Originally restricted to large quantity applications some POWERMITE models are now available from stock for small quantity orders. The unit shown is rated for 16 GPH at 350 PSI.

For other small quantity applications TUTHILL provides a complete selection of close coupled units with the pump mounted directly on the motor. Numbers 2 and 3 above are typical.

For applications, such as hydraulics which require smaller pumps, units such as Number 2 above provide outstanding advantages. Normally they can reduce space required for pump and motor by at least 6 inches, and cut weight by several pounds. Capacities range from 20 to 300 GPH. Pumps are available for pressures up to 1500 PSI.

Larger pump and motor combinations, such as Number 3 above, can be provided with capacities up to 50 GPM, for pressures up to 400 PSI.

If you are trying to put a pump and motor into a small space, TUTHILL has the answer. Write for details.

Tuthill Manufactures a Complete Line of Positive Displacement Rotary Pumps in Capacities From 1 to 200 GPM; for Pressures to 1500 PSI; Speeds to 3600 RPM.

TUTHILL PUMP COMPANY

941 East 95th Street, Chicago 19, Illinois

Canadian Affiliate:
Ingersoll Machine & Tool Co., Ltd.
Ingersoll, Ontario, Canada

PUMPS FOR YOUR PURPOSE

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☐ Please forward complete information on TUTHILL close-coupled Pump and Motor Units for_____GPH at_____PSI.

☐ Please have your representative call.

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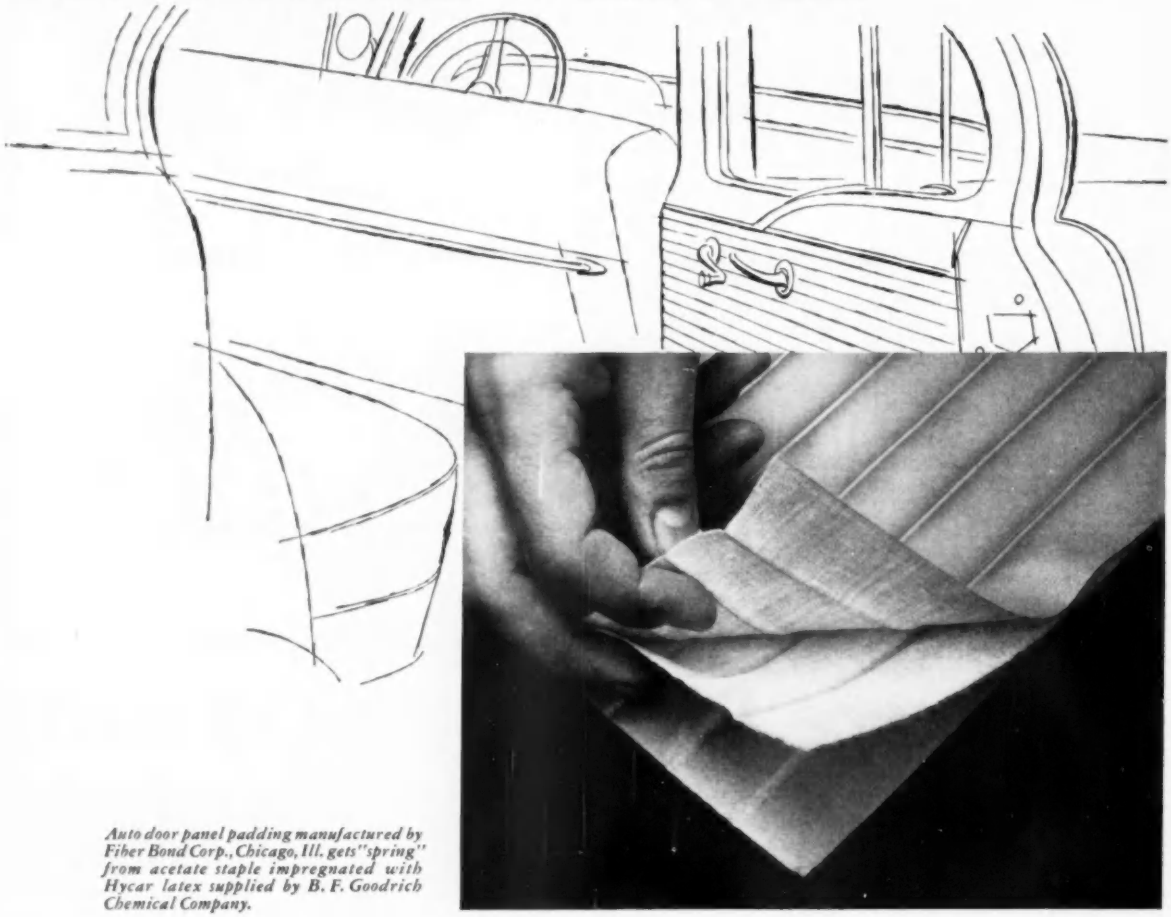
Another new development using

B.F.Goodrich Chemical *raw materials*



Auto door panel padding manufactured by Fiber Bond Corp., Chicago, Ill. gets "spring" from acetate staple impregnated with Hycar latex supplied by B. F. Goodrich Chemical Company.

Hycar latex puts bounce into acetate staple for auto interiors

THE padding in that new car door panel? Chances are good that it's acetate staple bonded permanently together and made springy by Hycar latex.

In this impregnated textile application, Hycar 1577 and Hycar 1561 provide strength, soft give and secure heat-sealed laminations of vinyl upholstery, staple and panel board. More good reasons for Hycar's use here—it withstands moisture; resists mold, mildew, fungi, insects; and does not discolor the vinyl.

Versatile Hycar latices are outstanding bonding media for other textile fibers, too: nylon, rayon, cotton, wool and many fiber combinations. They produce non-woven fabrics having good hand, rumple and mat-resistance, good crease recovery, washability and exceptional resistance to solvents and dry cleaning fluids.

New uses for non-woven fibers bonded by Hycar are born almost every day. Examples include garment inner linings, simulated chamois and washcloths. For information on Hycar latices, write Dept. KF-1, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

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Whatever your needs may be for piston castings or precision finished pistons, we cordially invite your full use of our cooperative engineering service and complete production facilities.

ZOLLNER CORPORATION

FORT WAYNE, INDIANA

DETROIT OFFICE: Jaikin Bldg., Birmingham, Mich.

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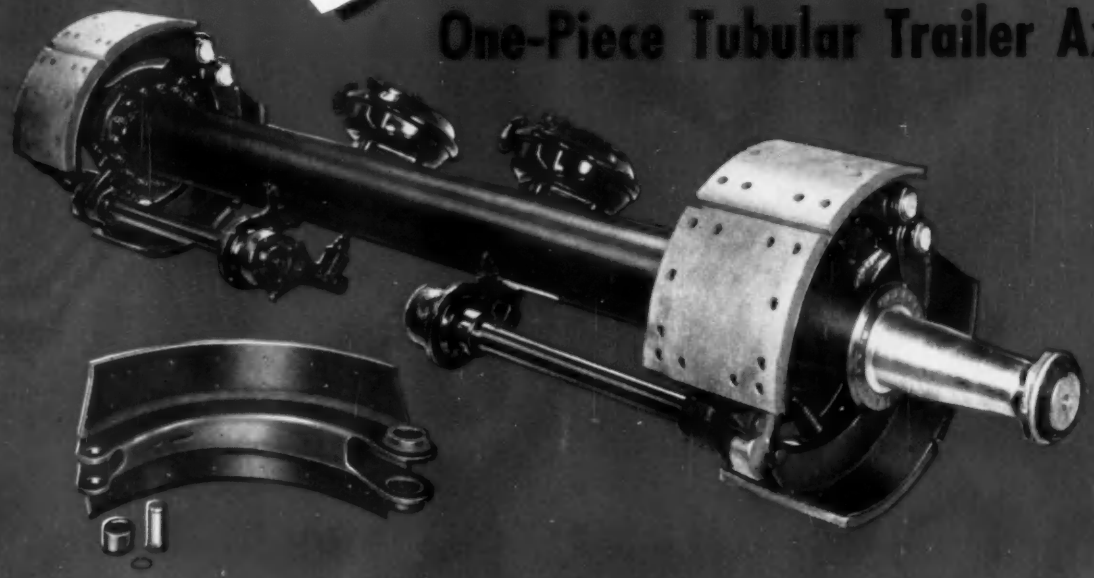
the 1958 SHULER

One-Piece Tubular Trailer Axle



Now Shuler brings you the finest trailer axle *ever* — a new light-weight axle of 18,000 lbs. capacity that retains all the famous Shuler *one-piece* advantages of the past, plus many NEW features.

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4. **New spring-loaded wheel bearing grease retainer and cam-shaft support grease seals—both of *proven* buna composition material.**
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7. **Extra-large anchor pins and bushings, and hardened cam rollers and roller shafts, for longer life, better service.**

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